

# NetworkWorld

The leader in network knowledge ■ [www.nwfusion.com](http://www.nwfusion.com)

September 9, 2002 ■ Volume 19, Number 36

## FURTHER TALES OF SUBSCRIPTION RENEWAL

**SUMMER VACATION IS OVER, AND BOB RETURNS TO HIS OFFICE TO FIND A LARGE STACK OF MAIL ON HIS DESK. HE SEES A NETWORK WORLD SUBSCRIPTION RENEWAL FORM YET TO BE COMPLETED. HE PANICS! QUICKLY, HE GRABS THE FORM...**

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1

What is the principal business activity at your location? (check ONE only)

01. ☐ Manufacturing (other)

02. ☐ Finance/Banking

03. ☐ Insurance/Real Estate/Legal

04. ☐ Health Care Services

05. ☐ Hospitality/Entertainment/Recreation

06. ☐ Media/TV/Cable/Radio/Print

07. ☐ Retail/Wholesale Trade/Business Services

08. ☐ Transportation

09. ☐ Utilities/Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)

10. ☐ Government/Military

11. ☐ Consulting (Independent)\*

12. ☐ Education

13. ☐ Camers/Voice/Data/ISP

14. ☐ Web Hosting/HSP

15. ☐ ASP/SSP/MSP

16. ☐ Manufacturing Computer/Communications/OEM

17. ☐ Resellers/VARs/VADs/Integrators/Distributors (Computers/Communications)\*

18. ☐ Other

\*ATTN CONSULTANTS, INTEGRATORS, DISTRIBUTORS, RESELLERS: PLEASE COMPLETE FORM BASED ON ALL CLIENTS AND YOUR OWN BUSINESS NEEDS.

2

P: What is your primary job function? (check ONE only)

A: What additional job functions are you involved in? (check ALL that apply)

P

A

1. ☐ Network Management

2. ☐ CIO/CTO/CSO/IS/IT/MIS/Systems Management

3. ☐ LAN Management

4. ☐ Datacom/Telecom Management

5. ☐ Internet/Intranet/Web/E-Commerce Management

6. ☐ Engineering Management/Applications Management

7. ☐ Corporate Management (CEO, COO, CFO, Pres., VP, Dir., Mgr.)

8. ☐ Consultant (Independent)

9. ☐ Other

3

What is the estimated value of network equipment and services that you specify, recommend, or approve the purchase of for this location and for all other locations?

A. THIS LOCATION

B. ALL OTHER LOCATIONS

(Please print the appropriate number code on the line next to each product category. Please complete ALL categories A-P.)

1. ☐ \$100 Million or More

2. ☐ \$50 Million to \$99.9 Million

3. ☐ \$25 Million to \$49.9 Million

4. ☐ \$10 Million to \$24.9 Million

5. ☐ \$1 Million to \$9.9 Million

6. ☐ \$100,000 to \$999,999

7. ☐ \$50,000 to \$99,999

8. ☐ Under \$50,000

9. ☐ None of the above

A. ☐ Large Systems (Mainframes/Minis)

B. ☐ Desktops (Monitors/Laptops/Workstations)

C. ☐ Mobile (Including PDAs, Wireless)

D. ☐ Servers

E. ☐ LANs

F. ☐ WAN Equipment

G. ☐ Camer Services

H. ☐ Internet/Web/E-Commerce

I. ☐ Intranet/Extranet

J. ☐ Internetworking (Including Routers, Switches)

K. ☐ Storage

L. ☐ Remote Access

M. ☐ Peripherals (Including Printers)

N. ☐ Software

O. ☐ Services/Support Services

P. ☐ Security

4

What is the total number of sites for which you have purchase influence?

(check ONE only)

1. ☐ 100+

2. ☐ 50 to 99

3. ☐ 20 to 49

4. ☐ 10 to 19

5. ☐ 2 to 9

6. ☐ 1

7. ☐ None

5

What is the total number of Servers/Clients installed/planned at your location/in your entire organization? (check ONE box in each column)

At Location

SERVERS

Entire Org.

At Location

CLIENTS

Entire Org.

A

1. ☐ 50,000+

2. ☐ 10,000 to 49,999

3. ☐ 1,000 to 9,999

4. ☐ 100 to 999

5. ☐ 50 to 99

6. ☐ 10 to 49

7. ☐ 1 to 9

8. ☐ None

B

1. ☐ 50,000+

2. ☐ 10,000 to 49,999

3. ☐ 1,000 to 9,999

4. ☐ 100 to 999

5. ☐ 50 to 99

6. ☐ 10 to 49

7. ☐ 1 to 9

8. ☐ None

C

1. ☐ 50,000+

2. ☐ 10,000 to 49,999

3. ☐ 1,000 to 9,999

4. ☐ 100 to 999

5. ☐ 50 to 99

6. ☐ 10 to 49

7. ☐ 1 to 9

8. ☐ None

D

1. ☐ 50,000+

2. ☐ 10,000 to 49,999

3. ☐ 1,000 to 9,999

4. ☐ 100 to 999

5. ☐ 50 to 99

6. ☐ 10 to 49

7. ☐ 1 to 9

8. ☐ None

6

What is your scope and involvement in purchasing decisions for network products and services for your enterprise?

A. SCOPE (check ONE only)

Corporate/Enterprise

1. ☐ Entire Enterprise/Multiple Enterprises

2. ☐ Multinational Enterprise

3. ☐ Division/Multiple Divisions

4. ☐ Department

5. ☐ None

B. INVOLVEMENT (check ALL that apply)

1. ☐ Create Network/IT Strategy

2. ☐ Create Short List

3. ☐ Recommend/Specify Brand

4. ☐ Authorize/Approve Purchase

5. ☐ Evaluate Products/Services

6. ☐ Determine the Need

7. ☐ None

7

What is the estimated number of employees in your entire organization/at your location? (check ONE in each section only)

A. ENTIRE ORGANIZATION

B. AT YOUR LOCATION

1. ☐ Over 20,000

2. ☐ 10,000 to 19,999

3. ☐ 5,000 to 9,999

4. ☐ 2,500 to 4,999

5. ☐ 1,000 to 2,499

6. ☐ 500 to 999

7. ☐ 499 or Less

8. ☐ 250 to 499

9. ☐ 100 to 249

10. ☐ 99 or Less

8

Please indicate the Web/Security/LAN/Internetworking/Wireless/Mobile/WAN Equipment/Carrier Services that you are currently involved in purchasing or plan to purchase. (check ALL that apply)

A. CURRENTLY INVOLVED IN PURCHASING

B. PLAN TO PURCHASE

WEB

WIRELESS/MOBILE

LAN/INTERNETWORKING

CARRIER SERVICES

SECURITY

WAN EQUIPMENT

9

Please indicate the Systems/Peripherals/Software/Applications/Business Services that you are currently involved in purchasing or plan to purchase. (check ALL that apply)

A. CURRENTLY INVOLVED IN PURCHASING

B. PLAN TO PURCHASE

SYSTEMS/PERIPHERALS

SOFTWARE/APPLICATIONS

10

Please indicate the platforms that are currently installed/planned. (check ALL that apply)

A. CURRENTLY INSTALLED

B. PLAN TO PURCHASE

NETWORK PROTOCOLS

DESKTOP/SERVER OPERATING SYSTEMS

LAN/WAN ENVIRONMENT

11

Which of the following hardware platforms are installed/planned in your company? (check ALL that apply)

A. SERVERS

B. WORKSTATIONS/DESKTOPS/LAPTOPS

01. ☐ IBM (Mainframes)

02. ☐ IBM RS/6000

03. ☐ IBM AS/400

04. ☐ Digital/Tandem/Compaq

05. ☐ Unisys

06. ☐ H-P

07. ☐ Other

08. ☐ Sun Microsystems

09. ☐ H-P

10. ☐ Compaq

11. ☐ IBM

12. ☐ Dell

13. ☐ Gateway

14. ☐ Fujitsu

15. ☐ Toshiba

16. ☐ Sony

17. ☐ Apple

18. ☐ Other

12

What is the estimated gross revenue of your entire company/institution? (check ONE only)

01. ☐ \$20 Billion or More

02. ☐ \$10 Billion to \$19.9 Billion

03. ☐ \$1 Billion to \$9.9 Billion

04. ☐ \$500 Million to \$999.9 Million

05. ☐ \$100 Million to \$499.9 Million

06. ☐ \$50 Million to \$99.9 Million

07. ☐ \$10 Million to \$49.9 Million

08. ☐ \$5 Million to \$9.9 Million

09. ☐ \$4.9 Million or Less

10. ☐ None of the above

13

For which areas outside of the U.S.A. do you have purchase influence?

1. ☐ Europe

2. ☐ Asia

3. ☐ South America

4. ☐ Australia

5. ☐ Middle East

6. ☐ Africa

7. ☐ Canada

8. ☐ None

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# Storage: Picnic or panic?

A special report on how to keep storage from overwhelming you. Insert begins after **page 28**.



# NetworkWorld

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September 9, 2002 ■ Volume 19, Number 36

InteropNet  
Labs

## Wireless security passes iLabs test

Exclusive coverage of the NetWorld+Interop 2002 InteropNet Labs (iLabs) hot-stage, focusing on ways to keep vulnerable traffic from being snatched out of the air by outside predators. **Page 51.**

NETWORLD  
+INTEROP

More N+I news inside  
Network security to take center stage. **Page 10.**



BRIAN GAIDRY

## Industry not jumping off InfiniBand-wagon

■ BY DENI CONNOR

Don't write off InfiniBand just yet, experts say, as momentum behind the high-speed bus transport has merely slowed, not stalled.

Despite recent pullbacks by Hewlett-Packard, Intel and Microsoft, those bullish on InfiniBand see promise in a lengthening line-up of advancements, including:

- Hitachi and start-up Voltaire are planning to announce this week that Hitachi will integrate Voltaire's InfiniBand switching software into its servers and storage.

- IBM is expected to announce as early as next week that its 4x (10G bit/sec) InfiniBand silicon is

generally available. A number of vendors, including start-ups Infinicon and Vieo, are readying to announce their support of IBM's InfiniBand silicon, which will be used in switches and routers.

- IBM, Legato Systems and Veritas Software intend to demonstrate their applications running on InfiniBand-enabled server clusters at next week's Intel Developer Forum.

- Intel and start-up Mellanox Technologies announced last week that they would release open source Linux drivers for the high-speed bus technology that will work with server and workstation adapters.

Moreover, a number of start-ups focusing on InfiniBand, such as DivergeNet and Topspin, are just emerging from stealth mode, and a few enterprise-size organizations, such as Wells Fargo Bank and the University of Washington, are evaluating the technology.

See InfiniBand, page 15

More than  
**\$400  
million**  
has been invested in  
InfiniBand start-ups,  
with Mellanox topping  
the list at \$89 million.

SOURCE: INFINIBAND TRADE ASSOCIATION

## IETF speeds transfer of huge files

■ BY CAROYLN DUFFY MARSAN

After five years of research and development, the Internet Engineering Task Force has completed a framework to support the distribution of massive files to multitudes of users.

The framework, designed to make one-to-many bulk data communications on the Internet or private IP networks practical, already is supported in products that Siebel Systems and PeopleSoft use to distribute gigabytes of software code between far-flung development shops. Other potential enterprise uses of the framework include oil and gas companies distributing seismic maps to

remote locations, global construction companies sharing technical documents among sub-contractors and IT shops backing up distributed databases for disaster-recovery purposes.

Network vendors that helped develop the framework within the IETF's Reliable Multicast Transport working group include Cisco, Microsoft, Motorola and start-up Digital Fountain, which started shipping its products earlier this year.

"If you want to distribute large files to multiple recipients, you have to think about how you're going to do that and how you're going to spare the Internet and

See IETF, page 85

## Spam filters revealing their darker side

■ BY JOHN FONTANA

Stepped-up efforts to eradicate spam are creating collateral damage as network executives and others find that aggressive filters can block receipt of legitimate mail and create uncertainty over successful delivery.

Antispam filters are a work in progress, and network professionals must carefully fine-tune the

software to ensure they don't cripple confidence in the reliability of e-mail, which has become an indispensable business tool.

Filters are causing headaches for e-mail senders, especially those who ship large volumes of legitimate mail such as newsletter publishers, who are seeing spikes in the number of messages that are filtered out

See Spam, page 16



# WHAT WINDOWS DOES THE SUN™ LX50



## INTRODUCING THE SUN LX50 SERVER WITH LINUX.

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# NetworkWorld

## Features

### iLabs team impressed with 802.1X



Volunteers gathered at a warehouse in California last month to build the largest public demonstration of 802.1X wireless security. Network World Test Alliance member Joel Snyder was part of the NetWorld+Interop iLabs team and reports that 802.1X lived up to its billing as a way to protect your wireless traffic from predators.

**Page 51.**



BRIAN GAIDRY

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## Interactive

### N+I breaking news

Stay on top of the latest happenings from Atlanta with our breaking news page. Also, our reporters will offer you their take on the show via their Interop Weblog.

**DocFinder: 2141**

### Switching files

In this online-exclusive part of our special report, "Storage: Picnic or Panic?" technologist Barry Flynn shares his thoughts on the future of distributed file systems.

**DocFinder: 2142**

## Forum

### Is there a future in networking careers?

Can you make a career out of networking these days? What would you advise those considering the field?

**DocFinder: 2143**

## Seminars and Events

### VoIP training comes to you

Looking for a cost-effective way to train your team? With equipment provided by Avaya, NetSmart's on-site VoIP training is the perfect way to educate your staff on the technology behind the merging of voice and data — without leaving the office. Sign up today. **DocFinder: 9945**

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## Columnists

### Compendium

Good intranets take time  
Fusion Executive Editor Adam Gaffin passes along a Web usability report on the 10 best intranets of all time, along with one expert's thoughts on what makes a useful intranet.  
**DocFinder: 2144**

### Help Desk

Slow NT 4 apps  
Columnist Ron Nutter helps a user who wants to know why applications on his Windows NT 4 server and workstation are slowing to a crawl.  
**DocFinder: 2145**

### SOHO Tech

Caldera pulls SCO out of its hat  
Columnist James Gaskin examines the newly renamed Caldera — now known as SCO Group — and its future.  
**DocFinder: 2146**

### The Bleeding Edge

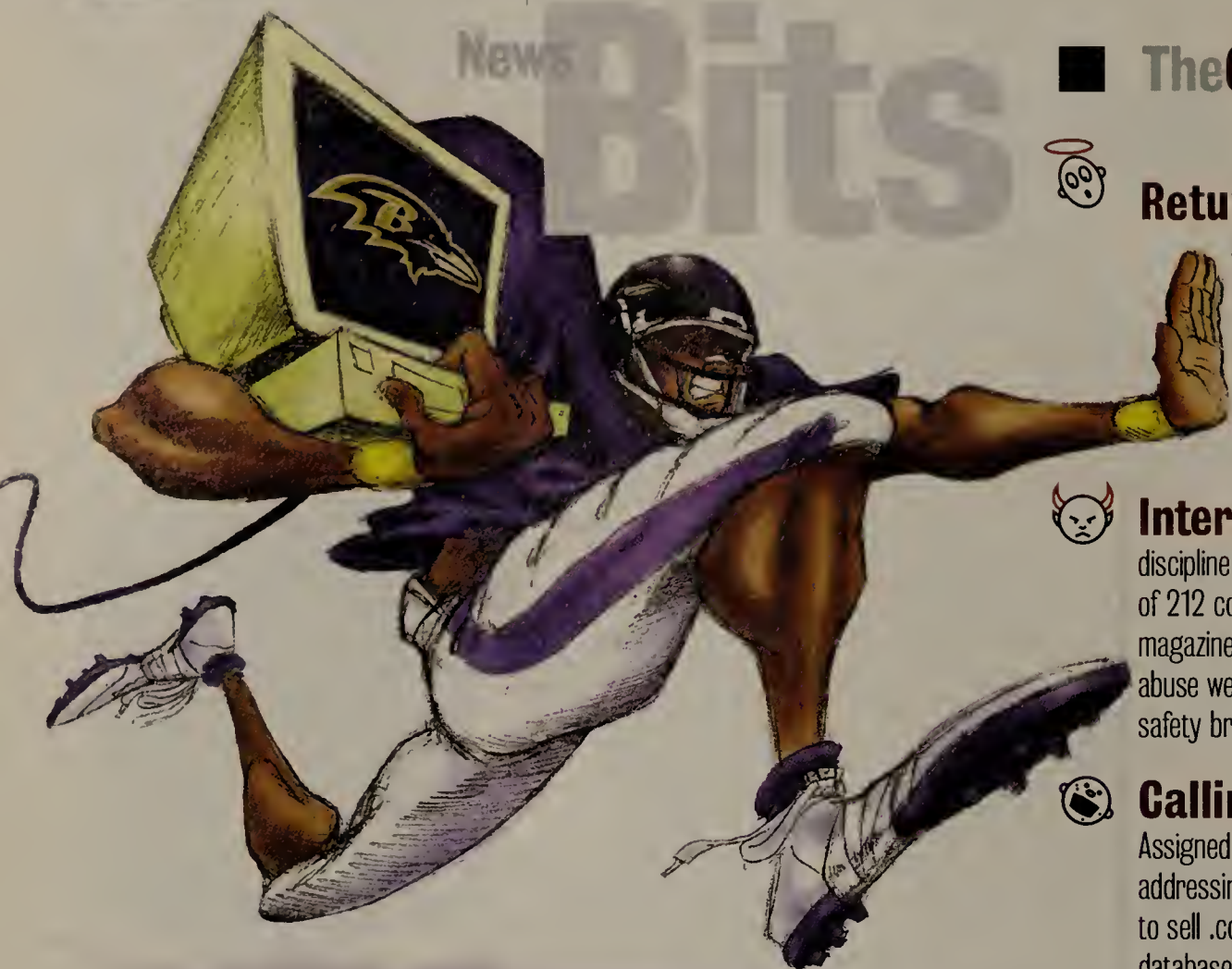
The end of telecom  
Columnist Daniel Briere says service providers either need to change their ways or go the way of the dinosaur  
**DocFinder: 2147**

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# News Bits



## Microsoft touts storage technology

■ Microsoft last week announced storage management software that it says will let its Windows 2000 Server and Windows .Net Server 2003 operate more efficiently with storage-area networks and network-attached storage. Storage vendors can use Microsoft's Multipath I/O to offer multiple paths between servers and storage devices, allowing improved load balancing and fault tolerance. Storage vendors such as Qlogic, Emulex, Hewlett-Packard and Network Appliance are expected to integrate it into products. The company has indicated that multipath I/O will be only one of several storage enhancements it will make to .Net Server 2003. Others include support for iSCSI, improved connectivity to Fibre Channel networks, and snapshot and point-in-time copy capability.

## Appeals court still opposes existing line sharing rules

■ The U.S. Court of Appeal for the District of Columbia this week upheld its earlier decision that incumbent local exchange carriers should not be forced to share lines with broadband competitors. Line-sharing occurs when an ILEC provides voice service and a competitive carriers provides a high-speed data service over the same local loop.

After the court made its original ruling in May, the Federal Communications Commission had asked the court to reconsider its ruling. The court did not change its decision though, saying the FCC did not take into account the cost ILECs pay for equipment that must be shared with competitors. The FCC has until January, 2003

### CONVENDIUM

## Fake wireless access points

One computer consultant has come up with a novel way to protect wireless LANs from hackers: Linux software that generates thousands of bogus wireless access points to confuse people who would glom onto your net.

Get more details and other vital stuff at: [www.nwfusion.com](http://www.nwfusion.com), DocFinder: 2149.

## ■ TheGoodTheBadTheUgly



**Return of the Ravens?** We don't really know if there is any connection between the speed of an NFL team's Web site and its chances for winning the next Super Bowl, but if there is, you might want to consider the Baltimore Ravens as your pick in the office pool. According to Internet quality measurement company Gomez, the Ravens boast a league best 2.8-second response time on their Web site. The worst? Washington, at 28.5 seconds.



**Internet miscreants.** What's the top reason for workplace discipline in the U.K.? Internet and e-mail abuse, according to a survey of 212 companies by London law firm Klegal and *Personnel Today* magazine. During the past 12 months 358 cases of e-mail and Internet abuse were cited vs. 326 cases for dishonesty, violence, and health and safety breaches, the survey says.



**Calling domain names.** The Internet Corporation for Assigned Names and Numbers, the group that oversees the Internet addressing system, last week threatened to strip VeriSign of its ability to sell .com domain names if the registrar doesn't clean up the public database of who owns which Web sites. In its statement, ICANN cited this example: "Despite repeated notifications over the past 18 months, VeriSign Registrar has failed to correct a Whois entry that shows a domain name registered to 'Toto', with an address 'the yellow brick road, Oz, KS.'" VeriSign could not be reached for comment.

to come up with a new system for line-sharing.

## IBM snaps up Access360

■ IBM last week announced a deal to buy Irvine, Calif.-based provisioning software firm Access360 for an undisclosed price. Access360 and its 128 employees will become part of the IBM Tivoli division, which has immediate plans to market enRole, the Access360 product that automates control over access rights management and password self-service. Long term, IBM Tivoli plans to integrate enRole into the IBM network-management suite and design new products around enRole, which is now used by about 30 companies.

## RIAA wins round vs. Aimster

■ Record companies that are members of the Recording Industry Association of America have been granted a preliminary injunction against the Aimster file-trading software service, which has been judged to have infringed the record companies' copyright. The injunction determines that companies and individuals will not be allowed to build a business on music they do not own and that they will be held responsible for their actions, the RIAA said. The court documents refer to Aimster, but the service has been known as Madster since February, when the Aimster domain name was assigned to AOL. The injunction was granted in the Northern Illinois District Court by Judge Marvin Aspen, who described Aimster as "a service whose very raison d'être appears to be the facilitation of and contribution to copyright infringement on a massive scale." RIAA is best known for its attack on the pioneering Napster file-sharing service, which it forced to close after a series of similar court cases.

## Covad, AOL strike deal over DSL

■ Covad Communications is granting AOL access to its DSL services over its U.S. network as part of a five-year wholesale agreement, the company announced last week. AOL will have access to a network that currently covers more than 40 million U.S. homes and businesses, Covad said. The company estimates its network reaches approximately 40% to 45% of all U.S. homes and businesses. As part of the agreement, for which terms were not disclosed, AOL has been issued warrants by the Santa Clara company, giving it the option to purchase a total of 3.5 million shares of Covad common stock, with an estimated value of \$3.5 million, Covad said. Covad emerged from bankruptcy last year when the U.S. Bankruptcy Court for the District of Delaware approved the company's reorganization plan.





# So many network applications. So little throughput. It's time for Gigabit to the desktop.

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# Microsoft patching hole in CryptoAPI

■ BY JOHN FONTANA

REDMOND, WASH. — Microsoft has a fundamental flaw in its security infrastructure, and network executives who want to run applications that use digital certificates or deploy cryptography software that runs on Windows will need to patch the operating system quickly.

An independent researcher discovered the flaw early last month in the Windows cryptography API (CryptoAPI), which provides the operating system's framework that programs use to obtain cryptographic services. The CryptoAPI supports encryption, decryption and digital certificate handling.

The problem is that the CryptoAPI does not check a parameter, called Basic Constraints, within a digital certificate that is used to validate digital certificate chains, the hierarchy of trust that cascades from top-level certificate authorities such as VeriSign. That means hackers can create bogus certificates and use them as trusted certificates without

being detected by Microsoft software, which would let them hijack secure communications or forge digital signatures.

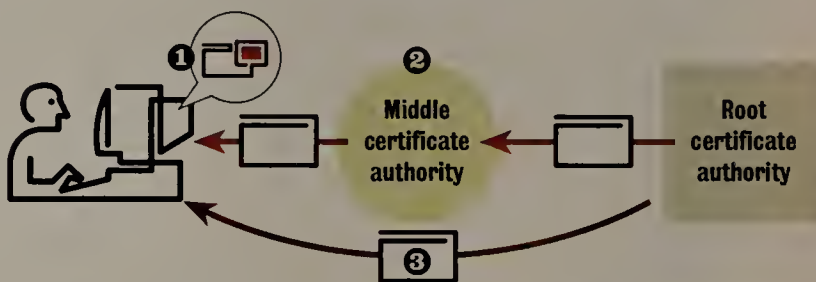
Researcher Mike Benham already has proven the flaw affects Microsoft's Internet Explorer and Outlook. It also has ramifications for users of the IP Security (IPSec) standard and Microsoft's Authenticode, which is used to validate as a trusted party anyone who provides executable code that a user might download and install. Microsoft's BizTalk server also relies on the CryptoAPI to handle its security services.

Vulnerability to the flaw extends to any application or third-party product, such as smart card services, that plugs into the CryptoAPI and relies on it to validate the chains of trust that issuers of digital certificates create.

"The big problem is that you have a fundamental flaw in a critical piece of infrastructure," says Russ Cooper, editor of the NT BugTraq Web site and the surgeon general for TruSecure. "If Joe Enterprise relies on the Crypto-

## Chain of trust

**Microsoft is patching a flaw in its cryptography software that lets a hacker use a bogus digital certificate to intercept secure communication or forge digital signatures.**



1 End user's software, such as Internet Explorer or Outlook, needs to check validity of digital certificate for services such as a Secure Sockets Layer transmission or a digital signature on an e-mail.

2 In a standard validation check, if a certificate issued by a middle certificate authority is used the software checks to ensure its issuer has the authorization to issue its own certificates and that the root certificate authority is trusted.

3 With Microsoft's flawed CryptoAPI, the Windows software never checks the authorization, or constraints, on the middle certificate authority certificate. Therefore it lets anyone with a root server certificate create a middle certificate authority certificate and pass it off as valid.

API to handle digital certificates for [Secure Sockets Layer], [Secure/Multipurpose Internet Mail Extensions], Authenticode, Active X controls or Active Directory using IPSec and digital certificates, then in order for him

to trust those systems he needs to patch those systems."

Cooper says he doesn't perceive an imminent threat but that the potential severity of the problem lies in the fact that digital certificates are becoming

more prevalent to support secure communications.

Last week, Microsoft began releasing patches for Windows 98, 98 Second Edition, ME, NT 4.0, NT 4.0 Terminal Server Edition, 2000 and XP.

"This chips away at the foundation of security with computers," says Doug Spindler, project coordinator for Active Directory at the Lawrence Berkeley National Laboratory.

"I don't see this flaw as a major blow, but you have to take it in context with all the others," he says. In the past month Microsoft has issued almost a dozen security patches for software such as SQL Server and Office.

Microsoft acknowledges it made a mistake in the development of the CryptoAPI, which was first used in later editions of Windows 95. Microsoft created the proprietary CryptoAPI instead of using the Generic Security Service Application Program Interface (GSS-API), which is an accepted standard. Microsoft since has added support for the Security Support Provider Interface, which is similar to GSS-API, to Win 2000 and XP to handle some security tasks, but the CryptoAPI remains an underlying service.

"With CryptoAPI we were trying to build in flexibility for nonstandard certificates, and that is how this vulnerability was created," says Scott Culp, manager of the Microsoft Security Response Center. "It's a classic flexibility vs. security issue."

But Culp says exploits of the flaw, especially with Authenticode, are difficult and often create a traceroute back to the offending party.

However, while experts say that digital certificates issued by top-level certificate authorities can be traced, they often are issued to a company or entity that distributes the certificate's private key to multiple users. Those who use the private key can be traced only as far back as the company named on the certificate.

"A certificate is a private key, and a private key can be used by many people," says Paul Hoffman, director of the Internet Mail Consortium. "One rogue programmer could use the private key to create bogus certificates."

Hoffman says that fact highlights why people need to safeguard their private keys. ■

# Solaris users put pressure on Sun

Angry contingent intensifies its lobbying for Intel platform support.

■ BY DENI CONNOR

STATE COLLEGE, PA. — Solaris users last week stepped up their campaign to get Sun to make the latest and future versions of its Unix operating system available on a range of Intel-based servers.

The users took out a half-page ad in the *San Jose Mercury News* titled "Shame on you, Scott," in hopes of getting Sun CEO Scott McNealy to respond. The 1,200-member group says McNealy has yet to answer its pleas, which have been issued in the form of letters to him and members of Sun's board.

Users, who have voiced their concerns through groups called SaveSolaris-x86.org and the Secret Six, are fuming that Sun abandoned development of Solaris 9 on Intel in January. They say Sun's attempt at appeasement — the bundling of Solaris 9 on a low-end Intel-based server called the Cobalt LX50 — just doesn't cut it.

"You get a lot of free software such as the directory and application server with the Solaris Linux version of the LX50 that you don't get with the Solaris [on Intel 8] version,"



**Mum's been the word from Sun CEO Scott McNealy regarding user pleas for new versions of Solaris on Intel platforms.**

says John Groenveld, associate research engineer at Pennsylvania State University in State College. He says those extras are worth about \$3,500.

"With the Solaris [on Intel 8] version we get only Solaris," says Groenveld, who uses Solaris on Intel for Web, Oracle database, firewalls, e-mail and edge servers.

"We want to be able to run the same version of Solaris with the same functionality on our laptops, our \$1,000 desktop PCs, all the way up to our million-dollar-plus StarFire servers," Groenveld says. He says that Penn State

spends hundred of thousands of dollars on Solaris each year.

Another Solaris user, the Edward Jones Brokerage, which has more than 7,000 Intel-based servers running Solaris, is threatening to migrate to IBM's AIX if Sun doesn't listen to its complaints, sources say. So far Sun is sticking to its guns.

"We've been working with the [Solaris on Intel] community for some time to find original and creative ways to get around this and to build a business model that makes sense from our standpoint and a development

model that makes sense for the community," says Bill Moffit, product manager for Solaris at Sun. "Unfortunately, we are a business that has fallen on some difficult times, so we have to make some hard decisions that aren't going to satisfy everyone."

Sun soon is expected to offer a product called Solaris Express, a beta version of Solaris 10 that will run on any Sun SPARC or Intel server platform.

Users say this effort isn't enough.

"The problem is that Solaris Express is a beta platform — there is no upgrade path for customers that are on non-Sun hardware, except to run a beta version of software," says Bruce Riddle, a Unix systems administrator at Agere Systems in Allentown, Pa.

"We are moving toward Linux on Intel in some areas because a Sun Solaris offering isn't there," says Riddle, a member of the Secret Six, a group that has been negotiating with Sun for a current version of Solaris on Intel.

Separately, other vendors are exploring their Unix-on-Intel options. The SCO Group (formerly Caldera) is reported to be revisiting a version of Unix for Intel servers once attempted through an effort called Project Monterey. Hewlett-Packard, meanwhile, is porting its HP-UX, OpenVMS and NonStop operating systems to Intel's 64-bit Itanium platform. ■



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# Security to find spotlight at Interop

■ BY PHIL HOCHMUTH AND  
TIM GREENE

It seems only fitting that with the country's focus on shoring up personal and national defenses that this week's NetWorld+Interop 2002 Atlanta show will focus on network security products.

A harvest of wares from vendors such as Foundry Networks, Funk Software and newcomer SaberFile promise to add authentication and security to all areas of corporate networks.

Against a backdrop of economic malaise, attendance for the show is projected optimistically at 30,000 — down from the more than 50,000 the show used to draw. Several large network

vendors also will be absent on the show floor, including Alcatel, Avaya, Cable & Wireless, Cisco, Hewlett-Packard, Intel, Network Associates and Nortel. Cutbacks were given as the



main reason why many vendors were skipping the fall event. Low turnout also could be blamed on the fact that the show falls on the week of the anniversary of Sept. 11.

But the show must go on, promoters say, and much of the talk at N+I will focus on the 802.1x protocol, a method for authenti-

cating network users at Layer 2, or the data-link layer, of a network connection, which is a hot security topic in the wireless and wired network communities.

The show's InteropNet Labs will feature a vendor-neutral proving ground for 802.1x technology among wireless LAN vendors (see related story, page 51). Also, lots of new 802.1x-based gear will be on display.

"Wireless security has always been a grave concern, especially in the retail environment," says Kip Miles, a retail IT executive who is attending N+I to learn more about wireless LAN security technologies.

"Right now, a lot of the security features that come embedded in [wireless LAN] equipment are not up to snuff," Miles says.

Miles says many application vendors in his industry sell software that takes advantage of wireless networks, but security is often an afterthought. "It becomes a chore for a store's IT department to wrap security around the network or to add a layer of security to that application."

Funk and ReefEdge will have 802.1x-based products for wireless LAN management and security.

Funk will announce wireless LAN security and management features with upgrades for its Odyssey Server and Steel-Belted Radius server software products. Funk says its Odyssey security server can be used to add and remove users from a wireless LAN network, and configure users' permissions. The company says the 802.1x technology can work with hardware from wireless gear vendors.

ReefEdge will have Version 3.0 of its ReefEdge Connect System for managing wireless LANs, with support for managing IP telephony users on an 802.11-based network. The software will work with Spectralink's line of wireless IP telephones.

"Wireless networks can be just as secure as their wired counterparts," says Craig Mathias, principal at the network consultancy Farpoint Group, who will give several lectures on security at the show. While the technology is becoming a buzzword among wireless security enthusiasts, Mathias says the protocol can help secure 802.11-based LANs and hard-wired nets.

"802.1x is emerging as an

important piece to the security puzzle, but it's just one piece," Mathias says. Encryption methods such as Kerberos and VPN technologies also play a role, he adds.

Along that line, Foundry will roll out new IronWare switch firmware for its line of FastIron LAN boxes that will incorporate port-based 802.1x security. The upgrade could let any of Foundry's FastIron enterprise switches force wireless clients to authenticate to a LAN port on the switch before gaining access to the network.

The upgrade also includes switch redundancy and failover features and a media access control-based security feature that can be used to lock out unauthorized network PCs and devices.

Also on the authentication front, Infoblox will have two

## Fear factor

# 85%

of 273 IT professionals surveyed by *Network World* said security was a main concern of theirs.

new appliances it says can help companies deploy Remote Authentication Dial-In User Service (RADIUS) and Lightweight Directory Access Protocol (LDAP) servers. The company says its RADIUS One server appliance can plug into a network and simplify the deployment of RADIUS authentication. The new LDAP One appliance can do the same for integrating LDAP into a company.

## Securing servers

With recent news such as the Microsoft Windows security vulnerabilities and SQL Server flaws posing security threats to NT and Windows 2000 boxes, Shavlik Technologies will release a free utility called HFNetChkLT. The tool automates patch scans on an unlimited number of machines, detects missing or misconfigured operating system patches, pushes operating system patch

See Interop, page 84

# Intel sells off LANDesk products to new venture

■ BY TOM KRAZIT

Intel last week said it would sell its LANDesk family of IT management products to The LANDesk Acquisition Corp., a new company set up by two venture capital firms.

LANDesk products are used to take an inventory of PCs connected to a LAN, remotely manage desktops through one client and roll out software updates to PCs over LAN.

The new business — formed by Vector Capital and vSpring Capital — will purchase the LANDesk Management Suite, LANDesk Client and Server Manager, and LANDesk Asset Service, among other products. Additional assets and intellectual property also will be acquired.

Intel will retain a minority equity position in the business, which will be managed through Intel Capital, the chip giant's investment division. Financial terms were not disclosed.

Intel has been selling off businesses it no longer considers key to its core semiconductor manufacturing trade. In the past year, the world's No. 1 chip maker left the consumer products and Web hosting businesses. It also shut down its online media broadcasting venture.

Joe Wang, formerly a vice president at Symantec, will be named CEO of the new company, which will have its North American headquarters in the Salt Lake City area. John Sutherland, who was general manager of the business for Intel, will stay on as vice president of operations.

About 150 employees work for Intel's LANDesk business unit worldwide. The current management team will be offered positions with the new company. Intel also plans to offer transition services to existing LANDesk customers until the deal closes, which is expected to happen at the end of this month.

Intel said during a conference call presenting its second-quarter earnings in July that it would seek certain "business divestments" that would help reduce its operating costs.

*Krazit is a correspondent with the IDG News Service's Boston bureau.*



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# IT spending in check

Budget growth modest, say two financial analyst firms.

■ BY ANN BEDNARZ

The results of two user surveys conducted by financial analyst firms agree: IT spending growth next year will be modest at best.

SG Cowen's Computer Industry User Survey, released last week at the firm's 2002 Information Technology User Survey, projects that IT budgets in 2003 will be 3.4% bigger than those this year.

Companies with less than \$250 million in revenue will increase their IT budgets an average of 8%, while companies with greater than \$250 million in revenue will see only 1.8% growth.

"It is extremely clear that most of the recovery we're looking at is going to be driven by smaller organizations," said Richard Chu, SG Cowen managing director, at the Boston event.

Meanwhile, the latest installment of Morgan Stanley's regular CIO Survey paints an equally conservative picture: "We believe that software spending will continue to be constrained through 2002 followed by a modest recovery in 2003," the firm wrote. "We believe that overall tech spending should lag the pace of a general economic recovery due to cautious buying behavior and the lingering effects of overbuying in the past."

Security and disaster-recovery projects ranked most important among SG Cowen's 700 survey respondents. "Everything else pretty much paled in comparison," Chu said.

The 225 respondents to Morgan Stanley's survey

said their top three priorities are application integration, security software, and enterprise resource planning software and upgrades.

Both surveys addressed the Linux phenomenon.

Linux continues to creep into corporations, Morgan Stanley says. In its survey, 29% of respondents indicated they own Linux servers; 25% are formally or informally considering purchasing them.

SG Cowen says Linux is increasingly pervasive: 44% of its respondents currently run Linux platforms, and 45% say they will emphasize Linux more in the future.

SG Cowen's data suggests Linux growth will be more at the expense of Unix than Windows, Chu said.

Web services seem to be as interesting to SG Cowen users as Linux. Today, 54% of respondents are using Web services, and 32% are evaluating for application integration or for new applications.

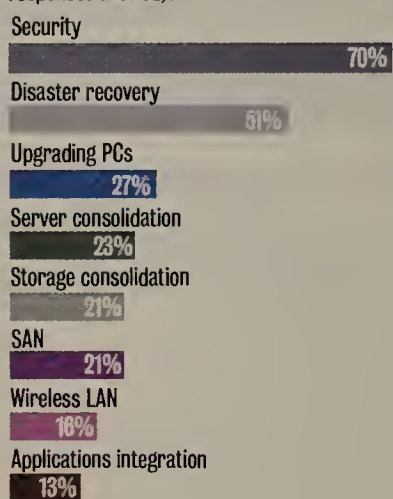
The level of adoption of Web services is surprisingly high, said Andrew Brosseau, managing director at SG Cowen. The numbers beg the question of how companies are using Web services, Brosseau said.

Meanwhile, interest in CRM software has cooled. SG Cowen found CRM is a strong candidate for becoming "shelfware" — meaning it sits purchased, but not deployed, at customer sites. The CRM market grew fast, and vendors were selling the software "at a pace much faster than the ability of customers to absorb and deploy those seats," said Rehan Syed, an SG Cowen managing director. ■

## Spending plans

**Security and disaster recovery topped the list of high-priority IT projects in SG Cowen's 2002 user survey.**

Percentage of 700 users who rated the following projects a high or medium/high priority (multiple responses allowed).



# Equant tunes VPN for video

■ BY TIM GREENE

Equant is introducing a managed VPN service designed to reduce customer costs for international videoconferencing.

Called Video for IP VPN, the service guarantees minimal packet loss, which is critical to the quality of video images. Equant says the service, which runs over its Multi-protocol Label Switching (MPLS) IPVPN network, costs less than commonly used and expensive international ISDN links, although the company would not provide figures. Equant acknowledges that for videoconferencing within a country there might be no difference in cost between its service and ISDN.

Many VPN providers offer voice class of service, but this is the first

video-specific product, says Michael Suby, senior analyst with Stratecast Partners. "We've seen SLAs enhanced to prevent jitter to accommodate voice, and providers have grouped voice and video together as real-time services."

Infonet last week introduced a voice class of service and promises a video class by yearend. Savvis Communications says it also will introduce a video class of service by yearend.

Equant recommends that packet loss for video be less than 0.5%, and it offers service-level agreements on the service, but SLAs vary depending on where the sites participating in a videoconference are located. Different regions support different levels of packet loss, the company says.

To buy the service, customers

must purchase Equant's Platinum-class service ports, ranging from 64K to 155M bit/sec, which let customers send video, voice and three classes of data over one connection. The company has two lower-performance port types for data called Gold and Silver.

Pricing for the service is based on whether a customer uses silver, gold or platinum ports, the bandwidth of the ports and where the sites are located. International connections cost more than in-country links. Setup costs for the service are about \$2,000 per site. There is an additional fee for managing the service, which is based on Polycom video equipment and a Cisco router at each customer site. Users also must pay for access lines to an Equant point of presence. ■

# SAP, Siebel tout their CRM wares

■ BY ANN BEDNARZ

SAP and Siebel Systems — archrivals in the CRM market — announced upgrades to their respective CRM suites last week. Both packages are aimed at making it easier for users to aggregate customer information scattered among multiple applications.

According to AMR Research, the driving force behind CRM adoption is efficiency. Siebel is taking a stab at improving productivity through automated business processes, while SAP is emphasizing portal access.

In Version 7.5 of its suite, Siebel embedded dozens of business

The German software maker launched mySAP CRM 3.1 last week at Sapphire '02, its user conference in Lisbon, Portugal.

The release more tightly ties in SAP's portal technology — gained in part through SAP's 2001 acquisition of TopTier — to provide access to business data contained in back-end systems. Companies can personalize content culled from different sources depending on users' roles. The CRM release also includes a new partner portal and a commissions-management tool.

Embedding its portal framework in the CRM package makes sense for SAP because many of its core CRM customers are engaged in business-to-business transactions, says Kevin Scott, senior analyst at AMR Research.

"This entails much more opening up of the back office than it would in a [business-to-consumer] environment," Scott says.

SAP also launched its Collaborative Master Data Management product, which is designed to integrate data from multiple systems.

Siebel and SAP also are trying to make it easier for customers to deploy their software. CRM is notoriously complex, and failure rates hover well above 50%, according to analysts.

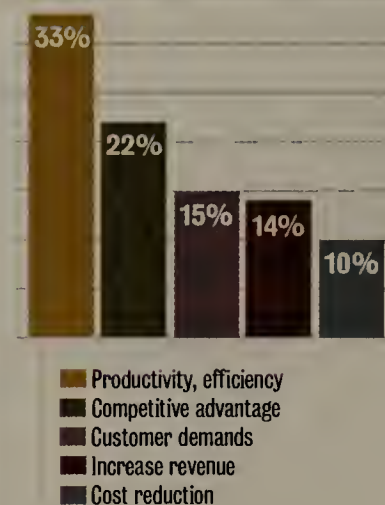
"We've got an economy that is very unforgiving right now," says Denis Pombriant, vice president and managing director of Aberdeen Group's CRM practice. "Vendors are recognizing that they really have to throw strikes, and they have to make sure that every deal is a success."

Siebel has done a good job of articulating a methodology for bringing its applications live, Pombriant says.

For its part, SAP earlier this year launched SAP Solution Manager, a platform that integrates content, tools and methodologies for implementing, operating and upgrading mySAP products. ■

## CRM incentives

**Users most often invest in CRM software to improve efficiencies, AMR Research found in a survey of 509 U.S. companies.**



process templates that users can adjust through configuration settings, rather than resorting to custom coding. Each business process accomplishes a specific task by knitting together what previously required separate steps to execute.

Some examples of Siebel's prepackaged templates are formula management for pharmaceuticals, and trade promotions and funds management for consumer goods companies.

Also new to Siebel 7.5 is Universal Customer Master, which collects data from multiple business units and disparate systems to create one repository of customer information.

SAP's latest data integration efforts center around portals.



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## InfiniBand

continued from page 1

Their interest in the high-speed interconnect is to provide faster connections between servers, storage and network devices. InfiniBand has been hailed as the fix for server I/O processing bottlenecks because it operates at speeds ranging from 2.5G to 30G bit/sec, much faster than current bus technologies that support speeds up to 1G bit/sec.

Users say the announcement by Hitachi and Voltaire is most significant, because it signals that a large vendor finally is supporting InfiniBand in a concrete way, as opposed to just a handful of start-up companies developing the technology.

"It's the right move on Hitachi's part — it's good for them, it's also good for the industry, because finally a storage vendor is stepping up to the plate," says John Blackman, systems architect for Emerging Technologies & Consulting at Wells Fargo Bank in Minneapolis.

However, analysts say that more large systems vendors need to endorse the high-

**“InfiniBand has been caught in this no man's land . . . the IT community has been totally gun-shy about looking at any new technologies.”**

**Arun Teneja**

Analyst, Enterprise Storage Group

While analysts project that InfiniBand first will be deployed in blade servers and as a link between processors in servers and storage, users are just now starting to think about the technology.

"Over the last quarter of this year we will be evaluating the requirements we need to move forward, the equipment we want to bring in and where we want to start," Blackman says. "Going into next year we will do all our technical assessments, proofs of concepts and pilots, so that in 2004, we'll be ready for production, provided the industry is ready as well."

Blackman intends to use InfiniBand in his data center initially to cluster servers.

age will increase from \$32 million in 2002 to more than \$1.53 billion in 2006.

Despite the initial sluggishness, there still appears to be significant vendor interest in the technology. Auspex, a network-attached storage vendor, has announced that it is using InfiniBand to tie together the processors in its NAS appliances; Network Appliance is rumored to be interested in the technology; and IBM has said that it would implement InfiniBand across its server lines.

Analysts also say the delay in InfiniBand deployment has hurt vendors that lack sufficient funding to carry them over the drought.

Banderacom is InfiniBand's latest victim. Just last month, the silicon adapter and switch company laid off two-thirds of its employees, CEO Les Crudele left the company, and sources say the company is looking to expand its product offerings into other areas.

Even Intel, Qlogic and Microsoft decided that InfiniBand didn't fit within their immediate goals. Intel abandoned development of its 1x (2.5G bit/sec) silicon. Qlogic announced last week that it would focus on iSCSI and Fibre Channel instead of InfiniBand; and Microsoft was writing an InfiniBand driver for Windows 2000 and .Net server but decided instead to focus on Gigabit Ethernet and let third-party vendors do the work.

Despite that, in the next month, observers expect system vendors such as HP, IBM and Sun to make announcements either about servers that will be InfiniBand-enabled, faster 4x silicon or statements of their dedication to the technology. IBM is expected to announce general availability of its 4x (10G bit/sec) silicon, code-named Torrent, as soon as next Monday.

In addition, a number of start-ups are expected to make their moves soon. DivergeNet is working on switches and host adapters to fit in host computers; InfiniFast is developing four- and eight-port switches; Topspin, a hardware and software start-up, is virtualizing InfiniBand, Gigabit Ethernet and Fibre Channel into the same pool for data center use. Like DivergeNet, SBS Technologies will make host adapters and switches; and CSS Labs is developing InfiniBand blades, switches, bridges and host adapters to go in servers.

In a related announcement, the InfiniBand Trade Association and Intel will launch the InfiniBand Evaluation program this week at the Intel Developer Forum to help customers evaluate and deploy InfiniBand products. ■

## Road ahead for InfiniBand

**InfiniBand revenues are projected to increase through 2006, after a slow 2002.**



SOURCE: THE YANKEE GROUP

speed bus and do it soon.

"Large vendors like IBM, Dell and Sun have to come out and say they are really going to deploy InfiniBand in their products for the market to be real," says Jamie Gruener, a senior analyst with The Yankee Group. "The next three to six months will be really crucial. Either InfiniBand will not take off because no one provides products at the large-vendor level, or it will take off and force other vendors to the table."

Recently Hewlett-Packard, Intel and Microsoft softened on their plans to implement InfiniBand hardware and software, causing user and vendor concern that their actions would result in a stampede away from the nascent technology.

## A rough development cycle

InfiniBand has had a rocky development cycle beginning in 1998, with few users implementing or even understanding the technology. Like other cutting-edge technologies, such as server blades and iSCSI, InfiniBand has suffered from economic conditions that are prompting users to make conservative decisions in favor of more established technologies.

"The timing couldn't be any worse," says Arun Taneja, an analyst for Enterprise Storage Group. "InfiniBand has been caught in this no man's land in the sense that the economy has been really bad, and with 9/11 happening, the IT community has been totally gun-shy about looking at any new technologies."

InfiniBand vendors acknowledge that they have been surprised by how long their technology has taken to develop.

"We were a bit aggressive about how quickly InfiniBand would be adopted," says Bob Fabbio, CEO of Vieo, an InfiniBand management company.

Gruener of The Yankee Group forecasts that InfiniBand used with servers and stor-

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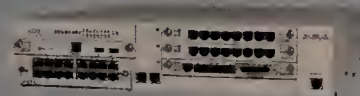
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## Correction

■ The story "New' HP posts mixed results" (Sept. 2, page 10) should have stated the managing director for brokerage firm SG Cowen as Richard Chu.



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## Spam

continued from page 1

by corporate systems.

Network executives and vendors admit that keyword searching just won't cut it, and that a combination of filtering techniques and more sophisticated filtering methods such as those that examine context must be used.

"There were good intentions with the design of content and spam filtering," says Dave Bailey,

can display their text messages and avoid filters, but Bailey says company engineers who needed to exchange images began complaining about mail being blocked and the system had to be adjusted. He says the company now quarantines blocked mail so users can inspect it if they wish.

Gail Coury, CIO for software developer J.D. Edwards, says she ran her filtering software in monitoring mode for a month to gauge its effectiveness before it

most offensive spam.

Uncertainty seems to be a consequence of filtering and is being felt by more users.

A recent survey by Osterman Research showed that only 25% of users were "very satisfied" with their spam filter's ability not to generate false positives. Another 35% said they were somewhat satisfied. Twenty-four percent were neutral on the issue, and 16% expressed a degree of dissatisfaction.

"The whole issue of blocking spam is a very difficult one right now," says Michael Osterman, president of Osterman Research. "This is still a real tricky area, and people are just getting their feet wet with filtering. It's experimenting with the tools to find the right balance for false positives."

He says what will drive administrators to take a more conservative approach is when the CEO sends a message that no one receives. "The bottom line is that people would rather get spam than not get e-mail."

Osterman says if companies can block somewhere in the neighborhood of 85% of the spam they get, they can be fairly certain that their false positives will be very low.

But he says the filtering issue is raising questions over trust in e-mail delivery, because spammers have taken such advantage of the infrastructure.

### Filtering out newsletters

No one knows that better than those that publish newsletters or send out large volumes of e-mail that users choose to receive.

"I hope these filters are a stop-gap measure and better solutions are on the way, because if they are as arbitrary as they are today [then] they will cause more problems than they solve," says Geoff Duncan, publisher of TidBITS, an opt-in e-mail newsletter for Macintosh enthusiasts.

Duncan says he has seen as much as 20% of his e-mail distribution of 45,000 newsletters get blocked. The offending words or phrases that have triggered filters included "Viagra" and "my pictures." He tried self-censoring but has since stopped because he said it was a losing battle.

"Private companies block e-mail, but for senders it can be a real problem," Duncan says.

"You never really know what filters are doing or not doing," says Brian Youngerman, who publishes an opt-in sports newsletter called Sports Bar Interactive.

**"I hate spam as much as anyone, but if you can't guarantee the delivery of e-mail or get the e-mail you are expecting that's not the Internet."**

**Brian Youngerman**

Publisher, Sports Bar Interactive

e-commerce and messaging architect for Imerys, a global mineral processing company in Atlanta. Bailey says the percentage of spam as part of his total e-mail volume has hit 30%.

He says spam filtering is an absolute necessity, but the Symantec filtering software he uses has taken some getting used to.

"We have found that these systems take some care and feeding, and that periodically you must check your log files to see what you are trapping," Bailey says. "We try to communicate to our business users that we are going to tune our spam filter, that they may lose some legitimate e-mail, and that we have procedures in place to handle that."

The company began filtering image files, in which spammers

went live.

"We learned that we needed to relax," Coury says. "We had to relax the keyword search; that was one issue."

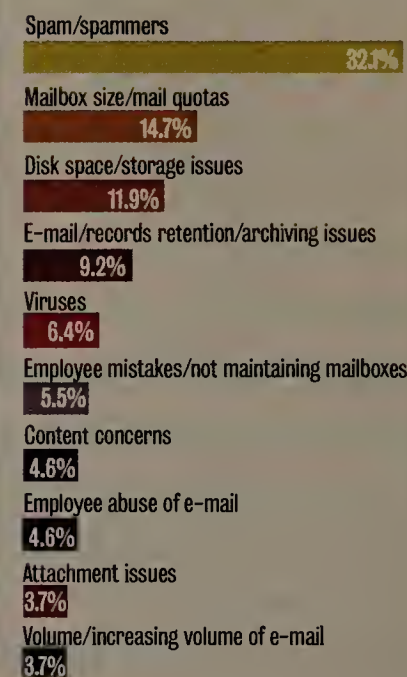
The company filtered out a crude three-letter word often found in pornographic spam only to discover that it was also an acronym used commonly by their developers. Coury says she logged 96 calls in the first 30 days of filtering from users who wanted to know why their mail was blocked. She says 40% of that mail was legitimate business mail.

"As long as spam is sent, we have to put some sort of controls in place, but it does create an uncertainty in message delivery," says Coury, who adds that users are pleased overall with the filtering because it eliminates the

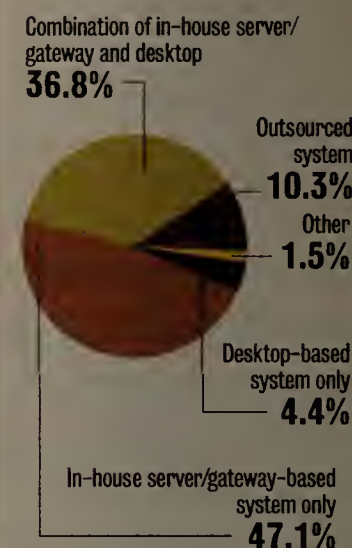
## Antispam survey

**A recent Osterman Research survey shows that spam is the No. 1 concern when managing corporate e-mail systems.**

What is the biggest problem you face in managing e-mail in your organization?



Which of the following best describes the ideal anti-spam capability you would ultimately like to implement for your organization?



"I hate spam as much as anyone but if you can't guarantee the delivery of e-mail or get the e-mail you are expecting, that's not the Internet. That's like Prodigy was years ago, a closed system."

Youngerman says this is the first time that users have to face the fact that their legitimate e-mail may not be delivered.

Vendors of spam filters are working to ensure that Youngerman's statement isn't fact for long.

Companies such as Brightmail, Postini, Cloudmark and MessageLabs tout the accuracy of their products and have devised various methods, such as dummy accounts to create lists of spam or tapping end users to create lists of

known spam, to combat the inaccuracies cropping up with keyword and content filtering.

"Accuracy is critical for us," says Enrique Salem, CEO of Brightmail, which provides serverside spam filters. "But if the recipient has a bad spam filter you never know what is going to be stopped."

Salem says Brightmail, which some estimate has nearly 50% of the antispam market, blocked 845 million spam messages in July and that the percentage of spam as a total of all e-mail sent has risen from 8% in September 2001 to 35% in July.

"Content filtering is not the answer. It has to be used in conjunction with other tools," says Pavi Diwanji, co-founder of Mail Frontier, which released its first product last month — client-side software for Microsoft Outlook. That product will be followed this month by serverside software that can work in tandem with it to provide various levels of filters and techniques to trap spam.

"E-mail is an open system and instant messaging is a closed system where you establish who you want to talk to — the future of e-mail is somewhere in between," Diwanji says. "Spam could ruin e-mail. You may just want to turn it off to the outside world."

## Fighting spam

**Network executives should follow a few general deployment guidelines to reduce the amount of legitimate e-mail that spam filters might block.**

- Run the software in a monitoring mode first to help you gauge what is being blocked before going live with end users.
- Start off with a conservative attitude toward blocking, which will let a lot of spam escape the filter but nearly eliminate false positives, and work your way up to an acceptable balance.
- Use a combination of filtering techniques such as keywords, domain and IP blocking, blacklists, whitelists or collection accounts. Look for software with more sophisticated filtering methods such as heuristics.
- Quarantine blocked mail and give users the option to see their mail that has been filtered before it is deleted.



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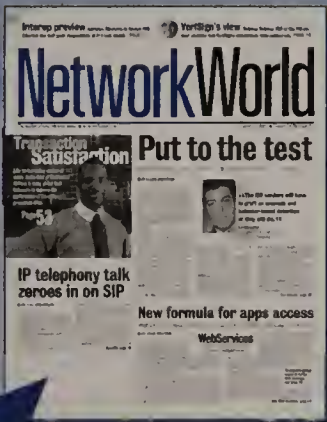
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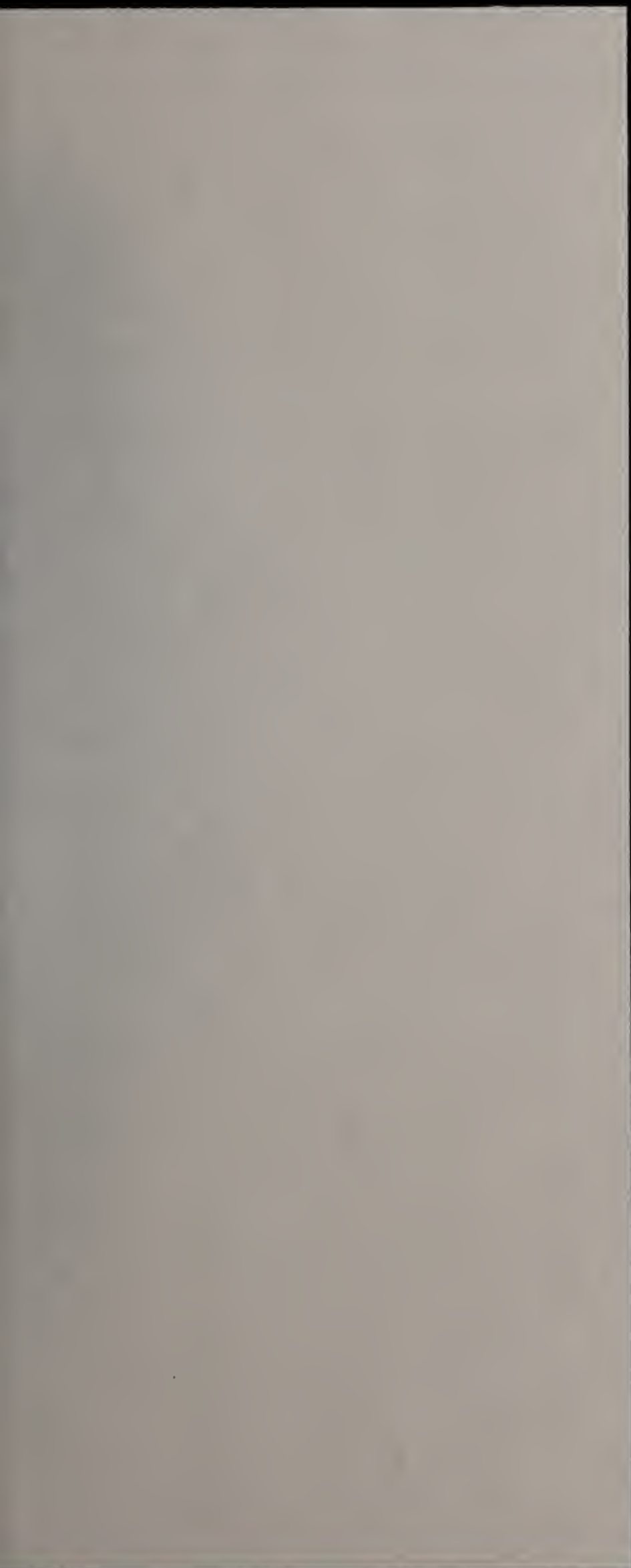
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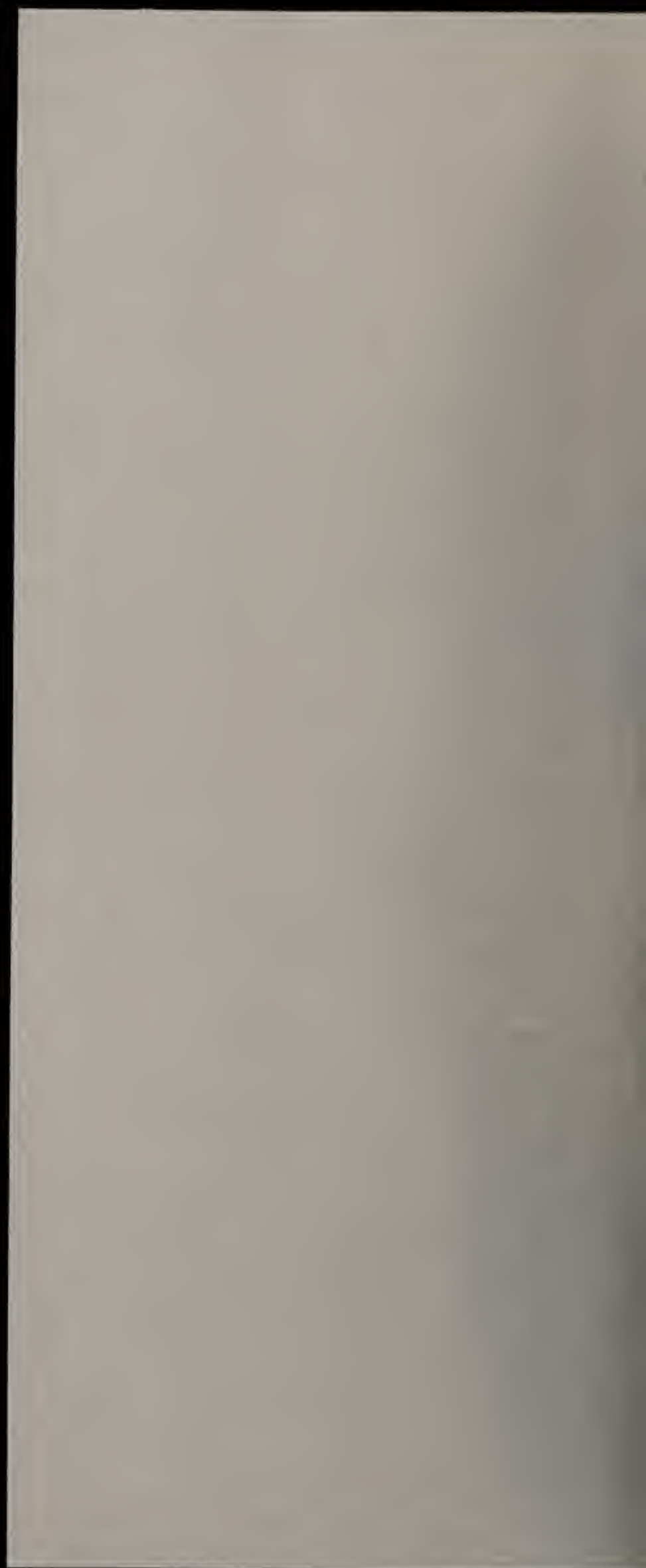
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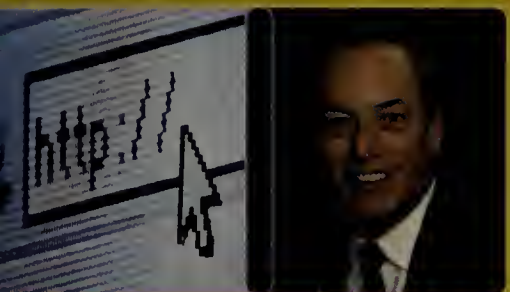












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# Study: Bluetooth security should raise red flags

■ BY JOHN COX

Because much of the Bluetooth wireless security model is optional, network execu-

tives should start setting policies for handling the short-range radio technology, according to new Gartner research.

A key element of that model is link-layer

security. But Bluetooth-equipped devices available today are not required to have this activated. The result: Corporate data can pass over a Bluetooth connection

between a mobile phone and a laptop unprotected by encryption and vulnerable to interception.

Bluetooth is a wireless specification, managed by the Bluetooth Special Interest Group (SIG), that describes a 1M bit/sec, 2.4-GHz radio connection that reaches about 30 feet. It's being used to replace cable connections between mobile phones, headset, laptops, PDAs, keyboards and fax machines. Each Bluetooth equipped product supports one or more Bluetooth applications, called profiles, such as file sharing, voice and dial-up networking. Bluetooth products can carry a Bluetooth SIG "classmark" or designation indicating which profiles are available.

The number of products carrying Bluetooth radios is surging, says William Clark, director for Gartner's mobile and wireless research. Already, nearly 700 products are on the market, from more than 50 vendors including Nokia, Palm and Hewlett-Packard.

## Securing Bluetooth

**Gartner's advice for using the wireless technology:**

- Be aware that a growing number of devices now include Bluetooth.
- Key security and management features are optional.
- Require link-level security.
- Always use application-level security, such as SSL or VPNs.
- Create corporate policies about Bluetooth risks, protections and usage.

Gartner estimates that 161 million Bluetooth-equipped products will ship in 2003, rising to 362 million in 2004. Close to 80% of these products will be mobile phones, laptops and PDAs. Employees could use Bluetooth to connect their laptop to a mobile phone or fax machine, create a mini-network of PDAs and laptops, or automatically synchronize information on different computers or handhelds.

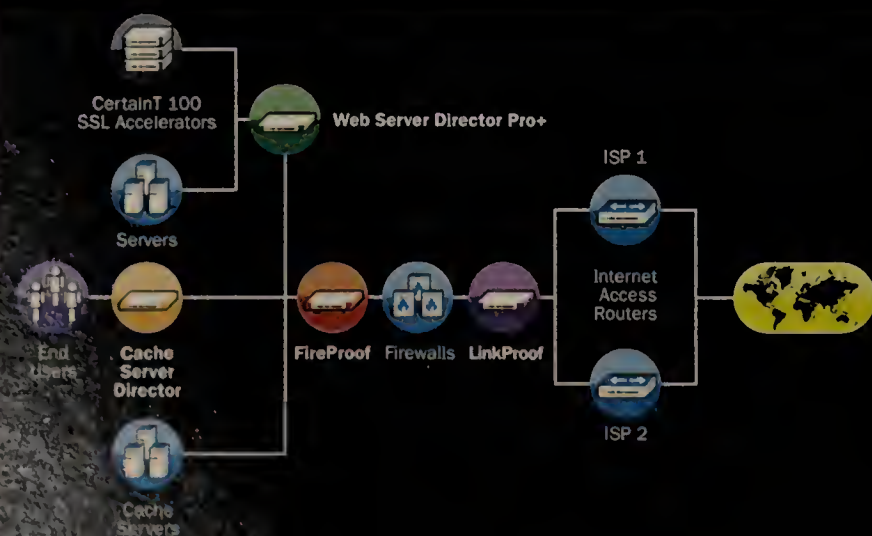
The Bluetooth specification works well at the lowest levels, Clark says, but many features affecting security and management are not required by the standards group. Besides the link layer, security settings for each profile are also optional. If these are not available or not activated data is vulnerable wherever Bluetooth is used as a connection medium, Clark says.

Clark has calculated that the two facts add up to unexpectedly high costs for companies. "We project that [Bluetooth] will add \$70 per user, per year, to the total cost of ownership for mobile computing devices," Clark says. Given that the Bluetooth SIG has announced a goal of driving Bluetooth chip costs to less than \$5, that's a huge premium for a big company with lots of Bluetooth devices. ■



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# TOLLY BENCHMARKS

Volume 1, Issue 1

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Executive editor  
The Tolly Group

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# Nortel sets high standard for network availability with Passport 8600

## Project Profile

**Product name:**  
Nortel Networks Passport 8600

**Version Tested:**  
REL3.2.2.0\_B030

**Product Class:**  
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**Testing Date:**  
April through May 2002

**Document Number:**  
202123

**For the complete Test Summary, visit:**  
<http://www.tolly.com/TollyBenchmarks>

## Nortel Networks Passport 8600

Recent tests of Nortel Networks' flagship core backbone switch demonstrate the capability to detect and recover from a variety of device, link and network failures in less than one second, ensuring that critical business applications continue unabated even during a hiccup in network availability.

The tests of Nortel's Passport 8600 Routing Switch prove that the device delivers carrier-class reliability to enterprise-level IP networks that support latency-sensitive applications such as voice and video alongside other business-critical data types on IP backbones. Moreover, the Passport 8600's capabilities ensure that service upgrades should have zero impact on network services and applications.

Nortel commissioned The Tolly Group to investigate the availability and reliability capabilities of the Passport 8600's Split Multi-link Trunking (Split MLT) and determine the impact that the switch's high-availability capabilities have on network reconvergence and on survivability of key switch components. Testing was conducted from April through May 2002.

Split MLT is a Nortel Networks capability that allows switches to be dual-homed to two Passport 8600s using standards-based IEEE 802.3ad link aggregation and eliminating the need for complicated Spanning Tree designs. By dual-homing with 802.3ad, users can improve network performance, resiliency and network redundancy.

Tolly Group engineers tested the high availability and reliability capabilities of Split MLT on the Passport 8600s by subjecting a pair of Passport 8600s to a variety of network and system outages. These included: loss of the Split MLT trunk, loss of the Inter-Switch Trunk link, loss of an aggregation switch, loss of a master switch fabric, loss of a Fast Ethernet/Gigabit Ethernet module and loss of a power supply, among other scenarios. In every failure scenario, the affected Passport 8600 reconverged network links in under one second. This is much faster than the network reconvergence of the Spanning Tree protocol, which is known to consume upwards of 30 seconds or more to rebuild network connections during a link outage.

In tests, Tolly Group engineers ran streaming video and VoIP traffic over the Split-MLT connections during a loss of switch system resources. The fail over was so fast at the sub-second rate that there was no loss of VoIP and video sessions, showing that application sessions can be maintained even during link failure.

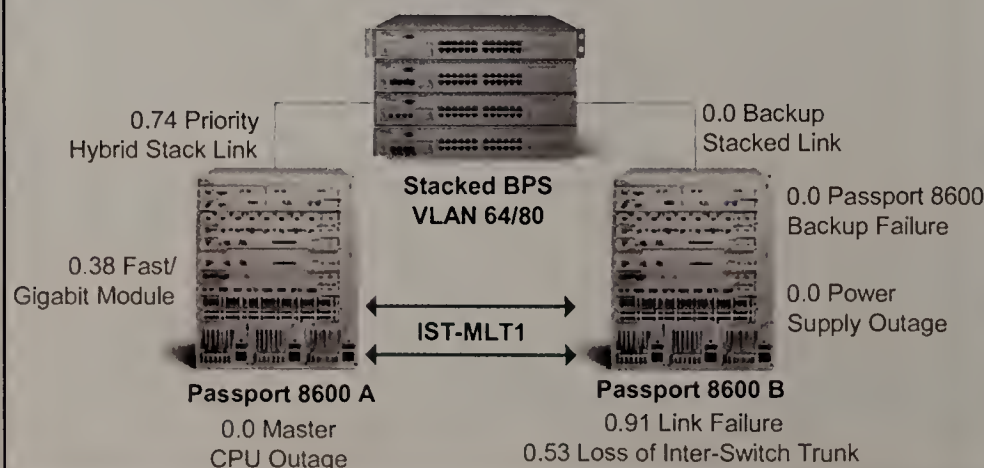
On the high availability side, engineers failed the Passport 8600's primary switch fabric and CPU. Loss of the switch fabric resulted in 380 to 525 milliseconds of non-forwarding activity, while the loss of a redundant CPU resulted in zero downtime.

Engineers also performed a "hitless" upgrade, meaning they could upgrade a Passport 8600 software without the need to take it down for maintenance. Also, engineers observed that modules in the Passport 8600 could be "hot swapped" without bringing down the system.

"Tests show that Nortel's Split Multi-link Trunking on the Passport 8600 demonstrates sub-second recovery on a link failure, preserving session state for critical services such as voice and video."

*Jim Quinn*  
VP, Technology  
The Tolly Group

## Average Sub-Second Recovery Times for Passport 8600 (Failure types denoted)





# HP Procurve switch beats top rival in Fast Ethernet/GbE throughput tests

## Test Highlights

- Delivers 100% of theoretical maximum throughput for all frame sizes in intra-module tests across 48 Gigabit Ethernet port pairs, as well as 192 Fast Ethernet port pairs
- Surpasses the performance of Cisco's Catalyst 4006 delivering up to 85% greater zero-loss throughput in various frame tests
- Delivers twice the forwarding performance as the Catalyst 4006 in a mixed topology network when handling 512-byte and 1,518-byte frames

## Hewlett-Packard Procurve Switch 4108GL

Hewlett-Packard Co.'s Procurve Switch 4108GL far outpaced a Cisco Catalyst 4006 in competitive Layer 2 Fast Ethernet/Gigabit Ethernet forwarding performance tests.

Customers who intend to deploy Layer 2 switches can do so with the confidence that the Procurve Switch 4108GL delivers zero frame-loss when handling line-rate bidirectional traffic. In addition, tests validate that the switch performs well in a mixed network topology and in a variety of port configurations.

HP commissioned The Tolly Group to conduct the competitive benchmark assessment of the HP Switch 4108GL, a high-density, high-performance Layer 2 switch with eight slots that accommodates a variety of modules. For these tests, The Tolly Group tested the switch with copper interface modules. The Cisco Catalyst 4006 offers six slots; for this test, engineers outfitted the device with copper interface modules.

In zero-loss Gigabit Ethernet bidirectional throughput tests, the HP Switch 4108GL delivered 100% of the theoretical maximum throughput at all frame sizes tested (64, 512, and 1,518 bytes) in a 48-port intra-module port-pairing scheme. By comparison, the Catalyst 4006 delivered 20% of the theoretical maximum throughput at 512- and 1,518-byte frames and 15% at 64-byte frames.

For performance tests in a Fast Ethernet network topology, the HP Switch 4108GL delivered 100% of theoretical maximum throughput at all tested frame sizes in multiple port-pairing scenarios. By comparison, the Catalyst 4006 delivered 95% of the theoretical maximum at 64-byte frames.

For performance tests in a mixed Fast Ethernet/Gigabit Ethernet topology, the HP Switch 4108GL delivered 40% of the theoretical maximum zero-loss throughput when forwarding 512- and 1,518-byte frames and 35% of the theoretical maximum throughput when forwarding 64-byte frames. By comparison, the Catalyst 4006 only delivered 20% of the theoretical maximum when forwarding 512- and 1,518-byte frames and 15% at 64-byte frames.

Beyond performance, the HP Switch 4108GL surpassed the Catalyst 4006 in cost-of-ownership comparisons, too. In tests of mixed Fast Ethernet and Gigabit Ethernet ports, the HP Switch 4108GL posted a total cost per gigabit of throughput of \$1,416 – more than 6-1/2 times less costly than the Catalyst 4006 cost-per-gigabit of \$9,260.

## Project Profile

### Product name:

HP Procurve Switch 4108GL

- Procurve Switch10/100-T GL Module (HP J4862A)
- Procurve Switch 100/1000-T GL Module (HP J4863A)

### Version Tested:

G.03.10

### Product Class:

Layer 2 Fast Ethernet/  
Gigabit Ethernet switch

### Testing Date:

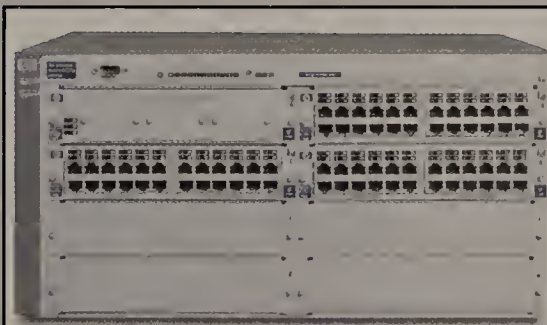
August through November 2001

### Document Number:

201138

For the complete Test Summary, visit:

<http://www.tolly.com/TollyBenchmarks>





# TCO study aims to compare five-year costs for Shoreline, Cisco VoIP deployments

## Test Highlights

- TCO analysis to compare Shoreline3 and Cisco AVVID costs over a five-year period
- Analysis covers a medium-sized enterprise of up to 1,000 users
- Report measures voice call-quality levels delivered by each architecture

## Shoreline3 Distributed IP Voice Architecture

The Tolly Group plans to release later this month a comprehensive analysis that compares the five-year total cost-of-ownership (TCO) for a mid-sized enterprise deployment of voice over IP utilizing alternative approaches from Cisco Systems Inc. and Shoreline Communications.

Shoreline Communications commissioned The Tolly Group to conduct a TCO assessment of its Shoreline3 Distributed IP Voice Architecture versus Cisco's AVVID in an enterprise network. The enterprise was defined as a 500- to 1,000-employee coast-to-coast domestic company, with the majority of the employees within the headquarters site. The enterprise configuration supports several regional offices with populations between 30 and 50 employees and for some small branch offices with five to 10 employees. Our research is also based on the assumption that there is a typical enterprise data network already in place.

Planning for the deployment included the development of a full network model, the collection of the capital costs of the equipment by creating an RFP and then getting quotes from authorized distributors. The network model was built using OPNET Technologies Inc.'s IT Guru software to analyze the impact of additional network traffic (with propagation delays) based on the national deployment, and to predict performance under various usage patterns. The capital costs and their associated maintenance costs were computed for the two boundary points of 500 and 1,000 employees.

For the calculation of the other costs (installation or ongoing customer system operations), selected tasks were identified and then a Tolly Group engineer performed that task to collect representative timings. These timings and the frequency of the event then were converted into costs by using the appropriate labor rate. All of these costs were then added together to determine over a five-year lifecycle what would be the cost of ownership. The inherent benefits of VoIP such as tariff avoidance, superior call management, etc were factored in as part of the critical tasks, but their opportunity savings were not considered as part of this model.

Since the purpose of a VoIP network is to provide for high-quality voice traffic as well as support for important user features, The Tolly Group also conducted a comparison of the voice quality for both the Shoreline3 and the Cisco AVVID solutions, using the network characteristics from the national deployment model.

This report will be available from The Tolly Group at the end of September. Contact The Tolly Group at (732) 528-3300 if you are interested in receiving this report.



## Project Profile

**Product name:**  
Shoreline3 Distributed IP Voice Architecture

**Document Number:**  
202500

**For the complete Test Summary, visit:**  
<http://www.tolly.com/TollyBenchmarks>



# Foundry FastIron 400 proves its interoperability mettle

## Foundry FastIron 400

Foundry Networks FastIron 400 successfully passed a battery of interoperability tests that show the modular switch delivers a broad range of interoperable support for Layer 2 services, Layer 3 routing protocols, as well as emerging big bandwidth options that support 10-Gigabit Ethernet.

Foundry's FastIron 400 passed interoperability tests with 13 rival brand switches, including gear from Cisco Systems, Nortel Networks, Extreme Networks and others. The tests were conducted in late June 2002 by The Tolly Group as part of Switch Interop, an annual demonstration of switching interoperability.

The FastIron 400's interoperability results demonstrate that the switch can blend into a multivendor switching fabric and communicate with third-party switches across a wide gamut of network functions.

The Tolly Group tested the FastIron 400 chassis (configured with JetCore modules) in five mandatory Layer 2 tests: Auto-negotiation of link speed with third-party devices, the capability to tag and pass/receive data frames supporting the IEEE 802.1p/Q specification, static-mode support for IEEE 802.3ad link aggregation, the capability to establish Gigabit Ethernet uplinks with third-party switches, and support for Accelerated Convergence of Spanning Tree to bring about rapid network reconvergence during link-state failures. In four of the five tests, the FastIron 400 interoperated with all of the other switches tested. In the test of Accelerated Convergence for Spanning Tree, the FastIron 400 interoperated with four other switches that participated in the test – an Alcatel OmniSwitch 700, Cisco Catalyst 6500, and an NEC America BlueFire 720 and BlueFire 740.

In Layer 3 tests, the FastIron 400 successfully demonstrated interoperability with all other switches tested in tests of RIP 1 and RIP 2 and OSPF protocols. In tests of IP multicasting support, the FastIron 400 demonstrated interoperability with all other switches in tests of the DVMRP (Distance Vector Multicast Routing Protocol). The FastIron 400 also demonstrated interoperability with eight other switches in tests of the PIM (Protocol Independent Multicast) Sparse Mode, and seven other devices that participated in tests of PIM Dense Mode. Likewise, the Foundry Networks switch successfully passed interoperability tests of the IPX routing and VRRP virtual router redundancy protocol.

In optional tests, the FastIron 400 proved interoperability with nine other participating switches. And the FastIron 400 was just one of five switches that participated and passed interoperability tests of a 10-Gigabit Ethernet LAN PHY interface.

## Partial Switch Interoperability Test Results Foundry FastIron JetCore

| Third-Party Devices<br>Tested  | Test Conducted |                |
|--------------------------------|----------------|----------------|
|                                | Jumbo Frames   | 10-Gig LAN PHY |
| Allied Telesyn AT-9812TF       | ✓              | N/S            |
| Avaya P882 MultiService Switch | ✓              | ✓              |
| Cisco Catalyst 6500 Series     | ✓              | ✓              |
| Extreme Alpine 3804            | ✓              | N/S            |
| Extreme BlackDiamond 6808      | ✓              | ✓              |
| Extreme Summit48si             | ✓              | N/S            |
| NEC BlueFire 720               | ✓              | N/S            |
| NEC BlueFire 740               | ✓              | N/S            |
| Nortel Passport 8600           | ✓              | ✓              |

Key: ✓ = Pass N/S = Not Supported



**FOUNDRY**  
NETWORKS

## Best Practices Recommendations -- FastIron 400

| Practice                                  | Description   |
|---|---|
| Maximize efficiency of LAN services       | FastIron JetCore implements proven interoperability with wide diversity of multivendor devices encompassing latest 802.* standards. Example: Support for 802.1p permits traffic prioritization and support for 802.1Q enables VLANs serving smaller logical communities within the physical net.  |
| LAN investment protection                 | All FastIron JetCore chassis use common modules; migration from 10 Mbit/s to 10 Gbits/s achieves LAN scalability and adds new features with no disruption to clients, servers, or other devices.  |
| Increase server farm throughput           | Implement Jumbo Frames on Gigabit Ethernet and 10-Gigabit Ethernet uplinks, thereby providing lower latency and improved packet handling efficiency for servers. FastIron 400's proven interoperability for Jumbo Frames on switches from Cisco, Avaya, Extreme, NEC and Nortel ensures support in multivendor nets. FastIron 400 also has successfully demonstrated 10-GbE interface interoperability with devices from Cisco, Avaya, Extreme Networks and Nortel. |
| Cost-effective connectivity between sites | FastIron JetCore's support for standards-based IP routing protocols enables network managers to migrate from costly private WAN facilities to public service provider networks. Here, Layer 3 standards-based IP protocol support is absolutely critical to participate in a multivendor WAN environment.   |



# Dell PowerConnect edge switch blends wire speed with QoS

## Test Highlights

- Manages traffic priorities dynamically during port congestion based on Layer 3 and Layer 4 information
- Delivers zero-loss, wire-speed throughput across all ports and packet sizes
- Achieves an aggregate throughput of 13.6 Gbit/s for all frame sizes tested

## Project Profile

**Product name:**

Dell Computer Corp.  
PowerConnect 3248

**Version Tested:**

Version 2.0.16

**Product Class:**

Enterprise-class edge switch

**Testing Date:**

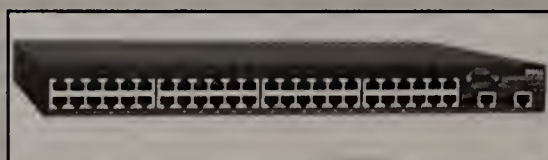
April 2002

**Document Number:**

For complete Test Summary details,  
go to: <http://www.dell.com/switchandsave>  
or call (800) 551-3355

**For the complete Test Summary, visit:**

<http://www.tolly.com/TollyBenchmarks>



## Dell Computer Corp. PowerConnect 3248

Zero-loss throughput used to be the defining selection factor for enterprise-class switches. Not any longer. The real differences between switch brands today emerge in the inherent intelligence of each product to provide flexibility and manageability in how bandwidth is utilized according to available Quality of Service facilities.

Recognizing the shift toward embedded switch intelligence, Dell Computer Corp. commissioned The Tolly Group to benchmark the performance of its Powerconnect 3248, validating not only that the product delivers zero-loss wire-speed throughput, but that it does so while ensuring that network-critical traffic is prioritized, even under severe congestion.

Support for QoS is a key differentiator for the Powerconnect 3248 to support delay-sensitive traffic, such as real-time SNMP network management data. As congestion builds and data types contend for bandwidth, the proper mechanisms need to be in place to ensure that the higher-priority traffic gets the bandwidth it needs, when it needs it.

The PowerConnect 3248 is an enterprise edge switch that was tested with 48 Fast Ethernet ports and two Gigabit Ethernet ports (built-in copper, optional fiber). Testing was performed in April 2002.

Test results show that the PowerConnect 3248 delivers 100% of the theoretical maximum throughput in Layer 2 tests of full-duplex (bidirectional), traffic streams of 64-, 512- and 1,518-byte frames. The PowerConnect forwarded 100% of the theoretical maximum, which is equivalent to 13.6 Gbit/s of aggregate throughput, for all frame sizes tested. The total packets per second (pps) for all 48 Fast Ethernet plus two Gigabit Ethernet ports when transmitting 100% load was 20,238,074 when handling 64-byte packets, 3,195,466 when handling 512-byte packets and 1,105,307 when forwarding 1,518-byte packets.

Test results also show that when presented with a scenario of 300% port over-subscription at both Layer 3 and Layer 4, the PowerConnect 3248 properly identified traffic types and prioritized, or dropped, data frames according to defined policy parameters.

Under severe port congestion, the PowerConnect 3248 demonstrated that its Weighted Round Robin (WRR) queuing algorithm ensured that Differentiated Services Code Point (DSCP) Layer 3 and TCP/UDP socket Layer 4 prioritized traffic is passed effectively at its assigned priority level. The switch also reallocates available bandwidth to the higher-priority stream, although at exceptionally high over-subscription scenarios (in excess of 300% port over-subscription), high-priority traffic takes a slight bandwidth hit, so that low-priority streams are not starved out. The PowerConnect 3248 QoS algorithm, however, can be adjusted to starve out low-priority traffic if high-priority traffic cannot be dropped.





# Siemens puts voice/data convergence to the test at Skyport

## Test Highlights

- Consistent toll-quality voice is achievable during peak and off-peak business hours
- QoS significantly contributes to consistent toll-quality voice as data traffic competition increases
- Sound network planning allows for extra bandwidth to accommodate surges in application usage

## Siemens Skyport

When it comes to converging voice and data onto a single physical network infrastructure, network executives can benefit from a blueprint that maps out exactly how to enable voice and data traffic to coexist in harmony without robbing the performance of either.

Siemens built Skyport, a state-of-the-art convergence campus network located in San Jose, Calif., to demonstrate just how to create the delicate balance between voice and data in a converged IP infrastructure. Siemens commissioned The Tolly Group recently to measure several significant attributes of Skyport that validate the network's capability to support voice and data fairly.

Engineers measured voice call quality, the effect of Quality of Service (QoS) on call quality, and the application data throughput rates and application response time of business-critical applications during peak usage hours.

In tests to measure the quality of voice over IP (VoIP) calls, Tolly Group engineers examined the Skyport network by taking representative call quality measurements across a five-hour span, from 10 a.m. to 3 p.m. during a typical business day. Tolly Group engineers employed the Perceptual Evaluation of Speech Quality (PESQ) metric. PESQ is an enhanced perceptual quality measurement for voice quality developed for end-to-end voice quality testing under real network conditions. Scores range from -1 to 4.5, with 3.8 or higher generally regarded as toll quality. In the Skyport tests, the network delivered a consistent average PESQ score of 3.87, regardless of the time of day the metric was recorded. Mean opinion score (MOS) tests corroborated the voice quality level, with MOS scores averaging 4.16 or slightly better than the 4.0 regarded as the MOS standard for toll quality.

Next, engineers tested the effect of QoS on voice quality. In five different test scenarios with QoS enabled, voice call quality measured 3.93 on the PESQ scale – well above the 3.8 toll-quality level. In fact, in two scenarios where engineers used 100% of data as the network load on top of existing voice traffic, and then oversubscribed that by another 20%, voice quality remained steady at 3.93 (PESQ). However, in the same test scenarios with QoS inactive, voice quality plummeted to 2.79 and 2.62 (PESQ) – showing the importance of utilized QoS to deliver the necessary bandwidth to voice traffic even during peak loads of data traffic.

Lastly, The Tolly Group examined the available data throughput rate on Skyport for applications vying for bandwidth against voice traffic. Tests show that there is always 17 Mbit/s of bandwidth headroom available on Skyport, when tested between 2 p.m. and 4 p.m. – the network's peak traffic load period. This means users of data applications can be assured bandwidth is available when they need it and that the network planners for Skyport had a reserved capacity of 20% on the links used for this test.

## Project Profile

**Product name:**  
Siemens Skyport

**Product Class:**  
Voice/data convergence network

**Testing Date:**  
May 2002

**Document Number:**  
Contact [info@tolly.com](mailto:info@tolly.com) for more information on this report.

**For the complete Test Summary, visit:**  
<http://www.tolly.com/TollyBenchmarks>



# SIEMENS





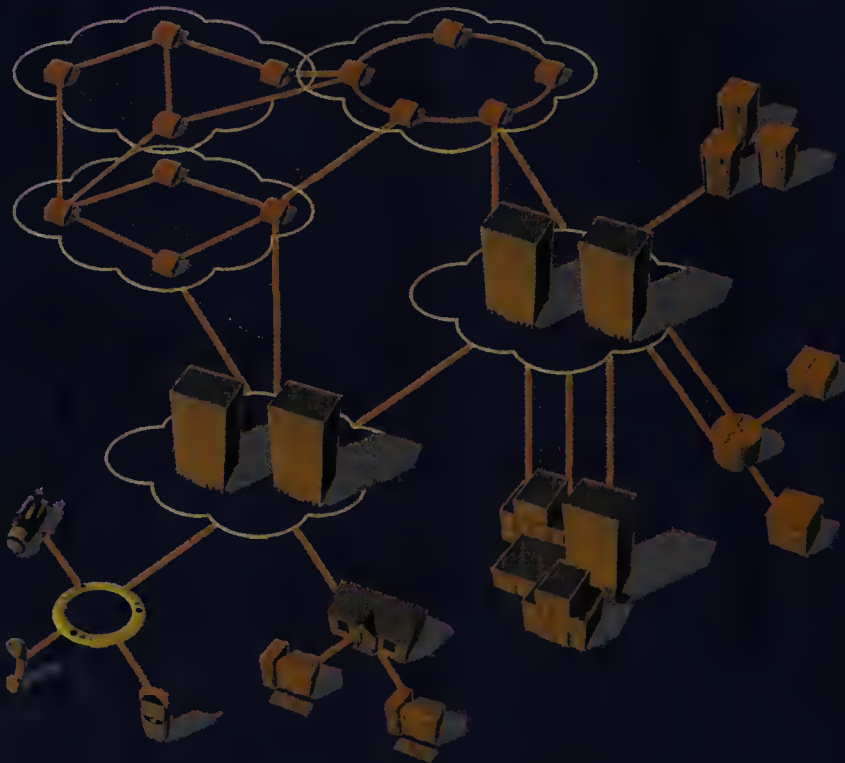
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+1 800.927.2660

[productinfo@spirentcom.com](mailto:productinfo@spirentcom.com)

##### Europe, Middle East, Africa

+33.1.6137.2250

##### Asia Pacific

+852.2166.8382

##### All other regions

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# Infrastructure

■ TCP/IP, LAN/WAN SWITCHES  
 ■ ROUTERS ■ HUBS  
 ■ ACCESS DEVICES ■ CLIENTS  
 ■ SERVERS ■ OPERATING SYSTEMS  
 ■ VPNS ■ NETWORKED STORAGE

## Short Takes

■ **Hewlett-Packard** last week launched a new line of Unix servers aimed at cost-conscious buyers, as it tries to inject new life into its flagging high-end hardware business. HP brought out three new servers, dubbed the **05 series**, that use slower processors than its mainstream Unix line and are only available in a few standardized configurations.

The new systems are available in configurations with one to eight processors and come with 10% to 40% price reductions compared with the faster Unix servers HP offers.

The discounted 05 series could attract customers facing tight budget constraints and help HP compete against Sun on low-end Unix products. The major trade-off with the new HP Server rp2405, rp5405 and rp7405 systems is their use of 650MHz PA-RISC chips. HP currently ships 875-MHz chips with the majority of its Unix hardware.

The rp2405, with one processor, 512M bytes of memory and 36G bytes of storage, will start at \$4,800. The rp5405 and rp7405 will cost \$29,000 and \$50,600, respectively. [www.hp.com](http://www.hp.com)

■ **SMC Networks** recently announced the **TigerSwitch SMC-8624T**, an Ethernet switch with 24 10/100/1000M bit ports, for about \$160 per port.

The box, which could be used in server farms or as a high-end work-group switch, also supports virtual LANs and management with Remote Monitoring and SNMP Version 2. Four mini-gigabit interface card slots also come on the box for adding copper- or fiber-based Gigabit ports.

The SMC8624T is available for \$3,820. Single-mode fiber 1000Base-LX mini-GBICs cost \$865 and 1000Base-SX (single-mode fiber) mini-GBICs cost \$500. The redundant power supply is \$840 extra. [www.smc.com](http://www.smc.com)

## Net storage options grow

■ BY DENI CONNOR

Network executives looking for ways to back up data have several new options that promise inexpensive data protection and recovery at faster speeds than their tape-based alternatives.

Among the new alternatives is Storactive's LiveServ, which lets administrators make copies as changes to data occurs, compress the data, store it to disk and then back it up to tape when time permits.

Customers now also can perform backups by quickly and continuously taking a snapshot of a disk and storing it on inexpensive Advanced Technology Attachment (ATA) or Integrated Drive Electronics (IDE) disks offered by Network Appliance, EMC, Quantum and Nexsan. IDE and ATA drives, commonly used in desktop PCs, are attractive as backups for network-attached storage devices because they are getting closer in cost to tape, which is less expensive, and their recovery capabilities are almost 100 times as fast.

"The price, capacity and reliability is making devices like cabinets of RAID not

**See Storage, page 22**

### Snapshot back-up products

A variety of storage vendors have products that let administrators take current copies of their data. Here's a sampling:

| Company                    | Product name  | Platform                    |
|----------------------------|---|-----------------------------|
| <b>BMC Software</b>        | Patrol Recovery for Oracle with Enterprise Snapshot for Unix                        | Unix                        |
| <b>Computer Associates</b> | BrightStor Enterprise Backup Image Backup   | Unix, Windows 2000, NT      |
| <b>EMC</b>                 | Timefinder, Snapview/IP   | Mainframe, Unix, Windows NT |
| <b>IBM/Tivoli</b>          | Enterprise Storage Server's Advanced Copy Services, Tivoli Storage manager          | Unix, Windows 2000, NT      |
| <b>Legato Systems</b>      | SnapImage   |                             |
| <b>Network Appliance</b>   | Snap Manager for Microsoft Exchange, Snapshot feature in Data ONTAP OS, SnapRestore | Windows 2000, NT            |
| <b>PowerQuest</b>          | V2i Protector   | Windows 2000, NT            |
| <b>Storactive</b>          | LiveServ  | Windows 2000, NT            |
| <b>Veritas Software</b>    | NetBackup   | Unix, Windows 2000, NT      |

## Route control delivers key business

■ BY TIM GREENE

SAN DIEGO — Route-control technology promises to deliver mission-critical applications with the lowest possible latency and packet loss, all at the lowest cost.

So when Qualcomm wanted to quickly deliver the latest version of its popular e-mail program, Eudora, it turned to RouteScience Technologies and its PathControl gear.

PathControl and other route-control equipment and services — from vendors such as netVmg, Proficient Networks and Sockeye Networks — use policies to pick the optimal Internet access link for customer traffic. As long as the customer has multiple connections to different Internet service providers, route-control technology can pick the appropriate one based on cost, latency, packet loss and usage priorities

as defined by customers.

In Qualcomm's case, the company had three partial T3 ISP links to choose from, to AT&T, UUNET and Sprint. At the time of the Eudora upgrade in June, the Sprint line was still being tested, but the Qualcomm IT staff pressed it into service immediately to handle the Eudora demand.

The company also was still testing the RouteScience gear, but again decided to put it into action for the expected deluge of demand for the Version 4.1 Eudora software, says Norm Fjeldheim, CIO of Qualcomm. If PathControl didn't work, he could just shut down the box and traffic would flow to the three ISP links based on routing decisions made by Border Gateway Protocol (BGP). So there was no risk that the equipment would make things worse.

As customers connected to Qualcomm servers to download the

Eudora update, PathControl determined how fast each ISP link could deliver the data. Based on that, PathControl, which is connected to the Qualcomm network as a BGP peer, issued BGP route changes to direct the downloads to the best ISP connection.

BGP chooses routes based solely on which one takes the fewest hops between routers, without considering delay, cost or other factors. As a result, BGP was directing most of Qualcomm's traffic to UUNET, which controls much of the Internet backbone.

With its three ISP links and a PathControl box, Qualcomm released the software two weeks ahead of schedule and did so without running into congestion, Fjeldheim says, despite peak traffic of 60,000 of the 8M-byte Eudora downloads per day.

Using its servers exclusively for deliver-

**Qualcomm, page 22**



WIRED  
WINDOWSDave  
Kearns

# The name game, Caldera style

and languished.

This year, the company joined with three other Linux vendors (SuSE, Connectiva and TurboLinux) to create UnitedLinux — a core which would be used by all four companies. But the official title of Caldera's product, "Caldera OpenLinux powered by UnitedLinux," is certainly never going to become a catchphrase.

Along the way, Caldera acquired most of the former Santa Cruz Operation (SCO) including its fairly lucrative intellectual property rights to versions of Unix derived from the former AT&T Bell Labs Unix System 5 (by way of Unix System Laboratories, which was briefly owned by — of all people — Novell!). That was curious at the time because it meant that Caldera's chief competitor was — Caldera! The Unix-based OpenServer and UnixWare from SCO were being sold alongside Caldera's OpenLinux. Many people found it hard to tell them apart.

In his new role as Caldera honcho, McBride has decided that Linux isn't key technology (so it's shipped off to the new UnitedLinux group), DR DOS is passé (so it's not even mentioned), and the SCO name should be resurrected because it at least has some recognition.

When he made the announcement a few weeks ago at the company's GEOForum meeting, it was met with a standing ovation. That could be because the crowd was made up almost entirely of veteran SCO resellers. More telling, though, was that many erstwhile Caldera employees couldn't decide how to pronounce the new name (the SCO Group) — was it "skowe" or "ess see oh"? Some used one, some the other, and some even hedged their bets by alternating the two.

The end result seemed to be that no one had thought out the change in detail. The change might help hold on to wavering SCO clients, but the confusion won't help

bring in new clients.

*Kearns, a former network administrator, is a freelance writer and consultant in Silicon Valley. He can be reached at [wired@vquill.com](mailto:wired@vquill.com).*

Shakespeare wrote, "What's in a name? That which we call a rose by any other name would smell as sweet." But evidently new Caldera CEO Darl McBride thinks that the right name could make all the difference for a company struggling with identity.

Caldera was born when Ray Noorda left Novell, acquired the rights to Novell DOS (formerly DR DOS, from Digital Research) and launched an antitrust suit against Microsoft. Later on, the company got the Linux religion — most likely, in great part, because it was another anti-Microsoft move. Caldera's OpenLinux had potential but little marketing savvy,

## Tip of the Week

Rumors heard in dark alleys seem to indicate that **NetWare 6.1** will ship before Microsoft's **.Net Server**, which will put Provo three releases up (NetWare 5.1, 6 and 6.1) to Redmond's one (Windows 2000 server). Perhaps there is some truth to the "smaller, leaner" formula!

## Qualcomm

continued from page 22

ing updates was a change for the company. It had been guaranteeing quick response time using service provider Akamai Technologies to cache copies of new Eudora releases at key locations throughout the Internet. But going it alone worked fine and had other benefits. "It's much cheaper than Akamai," Fjeldheim says, because all it requires is using the Internet connections that were already in place to handle other Internet traffic.

## Bandwidth not the answer

Qualcomm was buying the Sprint Internet connection because users had experienced delay connecting to Qualcomm over the other two links, Fjeldheim says. He felt his only option was to throw more bandwidth at the problem, but when he heard about route-control technology, decided to try RouteScience.

In addition to helping smooth out the glut of traffic Qualcomm experienced during the Eudora release, route control also cut down on delay between Qualcomm's San Diego headquarters and its offices in China. Delays had been 200 msec, and that dropped to 100 msec with the addition of the RouteScience box, says Ray Buccat, director of Qualcomm's corporate IT networking.

RouteScience: [www.route-science.com](http://www.route-science.com)

## Storage

continued from page 21

as necessary as they were two years ago. These devices represent to us a cheap, efficacious storage media," says Tom Hickman, engineering operations manager at online back-up provider Connected in Framingham, Mass.

According to industry observers, IDE/ATA drives cost about \$8,000 to \$10,000 per terabyte, while tape ranges from \$3,000 to \$10,000 per terabyte for storage access that is as much as 100 times slower.

Backing up data to tape is slow and as the amount of data on the network increases and allotting sufficient time to perform system backups may be untenable. When tape backup is occurring, application use is interrupted, leaving workers with little to do. As a result, snapshot backups and disk-based replacements, which back up data in real time, have become popular replacements for tape.

Among the advantages of employing disk-based snapshot backups are:

- Backups can occur continuously throughout the day, eliminating the need to take down the network to back up data.
- Because data is backed up more often, it is more current and less data is lost if a failure occurs.
- Data can be more quickly recovered from disk than it can from tape.
- The secondary disk, which is used as a temporary location for data, can be backed up with-

**IDA/ATA drives cost about \$8,000 to \$10,000 per terabyte, while tape ranges from \$3,000 to \$10,000 per terabyte for storage access that is as much as 100 times slower.**

out affecting the network's primary storage.

Snapshot backups give users all the advantages and more of real-time data mirroring. Because they take real-time images of the disk at scheduled times, if a virus hits the disk or corruption occurs, they easily can be rolled back to a point before the corruption occurred, leaving a clean system.

The frequency an administrator elects to take snapshot depends on the amount of data a business can afford to lose if there is a failure and the type of data it is. For instance, if the backup is of the business-critical financial data on an Oracle database, administrators might want to schedule as many images in a day as possible. Snapshot backup software lets as many as 92 versions of the data be taken, letting a network be backed up almost every 15 minutes, thus providing that no more than 15 minutes of data loss.

Although Hickman doesn't use snapshot backup, he understands the lure of the technology.

"We built a redundant storage mechanism before any of the technology was available," Hickman says. "If we were start-

ing out today, we would certainly give a hard look at [Network Appliance's] SnapManager and EMC Centera because we wouldn't have had to build all the redundancy into the software we use to back up our customers."

Hickman uses EMC's ATA-based Centera to archive less-frequently used back-up data before moving it to tape.

The number of snapshots a customer takes also depends on the storage capacity available on the device, as each image can consist of the portion of data that has changed since the last snapshot was taken (called changed block snapshot) or of the entire contents of the disk.

Recent changes to snapshot backups not only take a picture of the data, but also allow the state of the system to be saved to a CD-ROM so that if a server fails, it can easily be restored without re-installing the operating system, patches, service packs and applications. PowerQuest recently announced its V2i Protector, which lets administrators perform "bare metal" restores of Windows 2000 and NT servers from CD-ROM.

Storactive's LiveServ will pro-

tect Win 2000/NT, and .Net server when it is available.

Both products compete with products already available on the market from Veritas, Network Appliance and EMC. They work with traditional back-up software from Veritas Software, Legato Systems, Computer Associates or IBM/Tivoli.

Further, a number of vendors provide storage arrays assembled from ATA or IDE drives, whose price approaches that of tape storage. These drives, which are almost as fast and reliable as their more expensive SCSI or Fibre Channel drives, are ganged up in enclosures and, like their SCSI and Fibre Channel counterparts, can be hot-swapped when failures occur and configured as RAID drives for protection. EMC, Quantum, Network Appliance and Nexsan are a few of the vendors of ATA/IDE drives for network storage environments.

Storactive's LiveServ is \$800 per server; additional modules for backing up Exchange and SQL Server are available for \$800 per server. The software is available now. ■



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DocFinder: 2139



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|----------------------------------|-----------|------------|-------------|
| Equipment Network Upgrades       | \$30,000  | \$60,000   | \$30,000    |
| Installation – Hard Costs        | \$0       | \$1,700    | \$1,700     |
| Total Per Site Acquisition Costs | \$30,000  | \$61,700   | \$31,700    |
| Total Acquisition Costs (X16)    | \$480,000 | \$987,200  | \$507,200   |

| Annual Costs                 | SHORELINE | LEGACY PBX | NET SAVINGS |
|------------------------------|-----------|------------|-------------|
| Management                   | \$39,600  | \$72,000   | \$32,000    |
| Maintenance (Based on 10.1%) | \$48,480  | \$129,280  | \$80,800    |
| Long Distance                | \$30,000  | \$151,000  | \$121,700   |

|              |           |           |           |
|--------------|-----------|-----------|-----------|
| TCO Per Year | \$118,080 | \$352,280 | \$234,200 |
|--------------|-----------|-----------|-----------|

|                            |  |  |             |
|----------------------------|--|--|-------------|
| Total Savings Over 5 Years |  |  | \$1,678,200 |
|----------------------------|--|--|-------------|

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# Net.Worker

■ PRODUCTS, SERVICES AND STRATEGIES  
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## HomePlug units easy to use but slow

■ BY JAMES GASKIN

Good news from the networking-over-home-power-line world: Products adhering to the new HomePlug Version 1.1 specification are easy to use, reliable and interoperable. The bad news: Speed ratings for HomePlug (14M bit/sec maximum) are, shall we say, overly optimistic.

Four vendors — Asoka USA, Linksys, NetGear, and Phonex Broadband — provided HomePlug-certified products for review. You connect these power-line transceivers (a good technical term for these devices) to client computers via Ethernet or USB, and use Ethernet to connect to network hubs, other PCs or broadband modems.

Home building codes require power outlets at 12-foot intervals on every wall. Because of this, the modern home averages 45 plugs. Telephone jacks do not have the same saturation, pushing home network vendors toward wireless or power-line foundations. Wireless gets most of the hype, but HomePlug makes power-line networking an outstanding complement to wireless and a viable option for your home-based workers.

Running data over power lines is safe and relatively immune from interference from powered devices. The frequency used for data traffic is 4 MHz to 21 MHz, far from the standard 110-volt power range, although the HomePlug specification lets devices change frequencies and “adapt” to noisy environments.

| Net Results  |   |  |   |            |
|--|---|--|---|------------|
| <b>4.0</b> <small>RATING</small>   | <b>3.3</b> <small>RATING</small>  | <b>3.2</b> <small>RATING</small>   | <b>3.1</b> <small>RATING</small>  |            |
| <b>Phonex NeverWire 14</b>   | <b>Linksys EtherFast 10/100 Bridge and USB Adapter</b>  | <b>NetGear XE602</b>   | <b>Asoka PlugLink Ethernet and USB Bridges</b>  |            |
| <b>Company:</b> Phonex Broadband, (800) 257-0601, <a href="http://www.phonex.com">www.phonex.com</a> <b>Price:</b> \$129 MSRP  | <b>Company:</b> Linksys, (800) 546-5797, <a href="http://www.linksys.com">www.linksys.com</a> <b>Price:</b> \$99 MSRP | <b>Company:</b> NetGear, (888) 638-4327, <a href="http://www.netgear.com">www.netgear.com</a> <b>Price:</b> \$119 MSRP | <b>Company:</b> Asoka USA, (650) 591-3782, <a href="http://www.asokausa.com">www.asokausa.com</a> <b>Price:</b> \$99 MSRP |            |
| What's the score?  |   |  |   |            |
|  | Phonex  | Linksys  | NetGear   | Asoka      |
| <b>Setup 30%</b>   | 4   | 4  | 3   | 4          |
| <b>Closeness to 'idiot-proof' 30%</b>  | 4   | 3  | 3   | 3          |
| <b>Manual 20%</b>  | 4   | 3  | 3   | 3          |
| <b>Mounting flexibility 20%</b>  | 4   | 3  | 4   | 2          |
| <b>TOTAL SCORE</b>   | <b>4.0</b>  | <b>3.3</b>   | <b>3.2</b>  | <b>3.1</b> |
| <p><b>Individual category scores</b> are based on a scale of 1 to 5. <b>Percentages</b> are the weight given each category in determining the total score. ■ <b>Scoring Key:</b> 5: Exceptional showing in this category. Defines the standard of excellence. 4: Very good showing. Although there may be room for improvement, this product was much better than the average. 3: Average showing in this category. Product was neither especially good nor exceptionally bad. 2: Below average. Lacked some features or lower performance than other products or than expected. 1: Consistently subpar, or lacking features being reviewed.</p> |   |  |   |            |

But promised speeds of 14M bit/sec never materialized, or got anywhere close. To eliminate every possible variable, we plugged each pair of units into the same plug strip to test installation and data transfer speeds (running up and down stairs dozens of times for testing gets old quick). HomePlug standards strongly recommend avoiding all types of extension cords, surge

suppressors and battery back-up systems, and to plug the units directly into the wall socket. For my tests, however, I used a plug extension strip to isolate HomePlug traffic within the strip and require network travel of only a few inches to eliminate all variables found in homes, such as interference from other power sources (see How we did it, [www.nwfusion.com](http://www.nwfusion.com), DocFinder: 2132).

Transferring a 10M-byte WAV file took each brand of device about 20 seconds, plus or minus 10%. Averaged over three transfers, Phonex came in first at 19.64 seconds average, while the Linksys with a USB connection took 22.02 seconds (the Ethernet Linksys transferred the file in 21.06 seconds, on average). Because all units use the same fundamental chipset, close performances were expected, but seeing the rates max out at just over 500K bit/sec was disappointing.

We then used the HomePlug devices to reach out through a cable modem to [www.bandwidthplace.com](http://www.bandwidthplace.com) on the Internet, and it showed a transfer rate of more than 2M bit/sec. While these numbers seem contradictory, they show the problems that arise when testing system performance. Protocols, operating systems

and networking hardware all interact to the detriment of reliable performance testing. My tests are not scientifically definitive, but should serve as a warning about high-speed promises.

### Phonex NeverWire 14

Phonex uses only Ethernet connections for power-line gear. Because many PCs come with Ethernet ports and those that don't can be updated for less than \$30, Phonex can get away with selling a single product. The fact that installation and setup of Phonex NeverWire 14 products is nearly idiot-proof makes an Ethernet upgrade worthwhile if necessary.

Kudos to Phonex for the best manual (76 pages, including an index and glossary) as and the best Quick Start guide. The two-step process worked for me. Plug the NeverWire 14 units into a powerline. Plug the included Ethernet cables in, and you're networked. There is no software to load.

Of course, my Ethernet-enabled PCs are already configured to use Dynamic Host Configuration Protocol (DHCP) to join a network, and your remote workers might have to enable that first (see related story,

See HomePlug, page 26

## Short Takes

■ **Linksys** recently announced a bridge that connects Ethernet devices to 802.11b networks. The **Instant Wireless Ethernet Bridge** lets home networks and entertainment devices swap and store music, games and video files, and share a high-speed connection. In corporate networks, the bridge substitutes as a wireless adapter for any PC, Mac or Linux system, and can be used to create temporary wireless setups

between Ethernet devices, such as routers and hard disks. Attached to a hub, the bridge can link a 30-client workgroup to an 802.11b network. The bridge costs about \$130. [www.linksys.com](http://www.linksys.com)

■ Although devastated by the crash of the travel industry, the **hotel broadband market** will get a boost by mid-year, stated a recent report from In-Stat/MDR. "Pay-per-View or Free Shampoo: Where is Hotel Broadband Headed?" predicts equipment revenue growth will jump by about 250,000 ports per year after 2003, resulting in an annual equipment revenue of \$286 million by 2006.



**HomePlug**

continued from page 25

DocFinder: 2131). But Phonex deserves credit for ease of installation.

Unlike the others, NeverWire 14 devices include two buttons along with five status lights. The Test button starts a search for other Phonex NeverWire 14 boxes and blinks the Test status light for each device it finds (up to 16 Phonex devices are supported per HomePlug network).

The Security button initiates a process in which units communicate to set the HomePlug-standard 56-bit encryption scheme. Once you press the Security button on one unit, you must press the Security button on all other transceivers within 5 minutes to let Phonex enable encryption.

Of the four, these are the biggest units, larger than a fat paperback book, but they offer the most mounting versatility. You can stand them up, lay them flat or mount them.

You've likely never heard about Phonex because the 14-year-old firm only recently entered the retail market after years of making products for other companies. But its 14 years of designing, developing and manufacturing powerline products lets it hit a

home run right out of the first retail box.

**Linksys EtherFast 10/100 Bridge and USB Adapter**

Linksys offers devices with Ethernet or USB connections, but sells much more Ethernet. The company says customers often use powerline connections to complement wireless systems and stretch the network to places wireless can't reach, such as basements. Offering Ethernet and USB connections lets customers buy the same brand of transceivers for desktops with Ethernet cards and laptops with USB connections.

But unlike the Phonex gear, Linksys requires files to be loaded on the client PC before you get going. What's more, the Ethernet and USB boxes look nearly identical, and their installation CDs are identical except for a small label, which can be problematic if you're using both types of products and not paying close attention.

After configuring the powerline transceiver and rebooting, my PCs found the network. A security application loads to the client, letting you activate the 56-bit encryption scheme if you choose.

Linksys transceivers lay flat, but can stand

on their edge. Cables go to each end of the transceivers, making these units good candidates for laying on the floor.

**NetGear XE602**

NetGear's silver transceivers offer style and performance. About the size of a slim paperback, the XE602 (Ethernet) and XE601 (USB but not tested) come with a stand for vertical use, lay flat or attach to the wall. NetGear even puts screws in the box to make mounting easier.

Too bad the company didn't put that much thought into its installation documentation. No quick guide and no paper manual, just a file on the installation CD. The installation routine puts the security configuration utility on the client PC just as the Linksys unit did.

**Asoka PlugLink**

New to the U.S. but part of a 20-year-old Taiwan company, Asoka enters the fray with an industrial-looking but small metal box. An installation CD, much like that from Linksys and NetGear, loaded the proper USB drivers and security utility. One test PC still has the original Windows 98 installed, and Asoka balked when it didn't find

W98SE, but it worked once the drivers were copied manually from the CD to the client.

Documentation was a small manual covering the USB client and Ethernet bridge transceiver installation. However, the accompanying press materials included a color-quick setup guide and much larger, more complete manual.

The transceivers must be laid flat because the vent holes are on the sides and would be blocked partially if placed vertically.

These appear to be the first products in a home network line. They are solid if not flashy, and perform as well as the others once configured.

My tests didn't find major differences between the units. Technically, they are siblings, with packaging and installation details defining the differences. Unlike many product reviews, the spread isn't between good and bad but between pretty good and slightly better. Each product does what it promises — provides simple network connections — even if throughput wasn't as fast as I'd hoped (see related story, DocFinder: 2131).

*Gaskin is a technology writer in Dallas. He can be reached at [readers@gaskin.com](mailto:readers@gaskin.com).*

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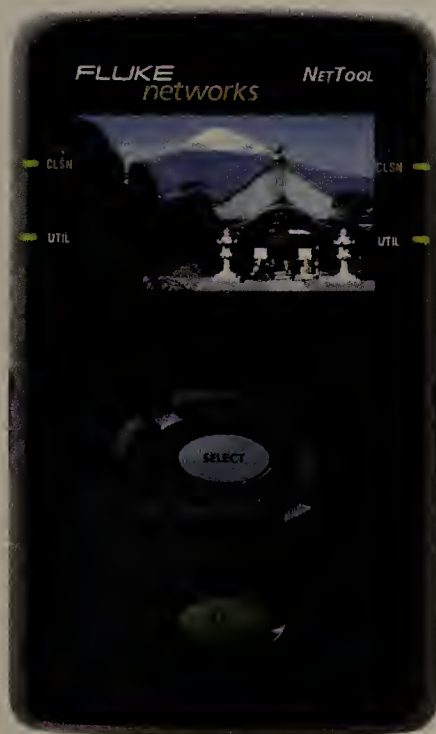
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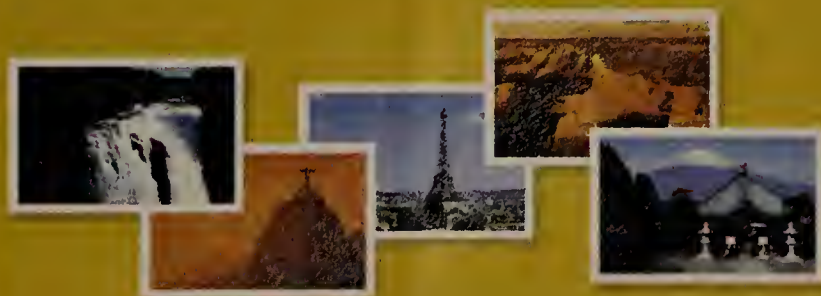


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# Storage 9.9.02

Picnic or panic?

How to keep storage from overwhelming you



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managing aging data

An editorial  
supplement to  
**NetworkWorld**



# Lighting a Path

*Cisco COMET portfolio provides an optical solution to demand*

**BY NOW** enterprises have learned only too well that providing network resiliency is a business imperative, not a luxury. But questions remain in terms of how best to ensure that a company can recover from any type of disaster, and that employees have uninterrupted access to the services and applications they need to do their jobs.

The issue comes down to two words: protection and agility. Enterprises need to protect their networks from any single point of failure, while being agile enough to rapidly recover from a disruption and deploy applications wherever they are needed. While these are hardly new concepts, they have taken on new urgency.

That sense of urgency is leading some users to discover new ways to meet the demands for protection and agility. A prime example is optical network technology, as embodied in the Cisco Systems Complete Optical Multi-service Edge and Transport (COMET) portfolio. Cisco COMET is a comprehensive product portfolio designed to integrate voice, video, data and storage applications over a single, end-to-end multiservice optical network. Cisco COMET enables enterprises to deploy highly fault tolerant networks that have the bandwidth and flexibility required to support applications such as data mirroring and backup, storage-area

networks (SAN), network-attached storage (NAS) and voice over IP, which can be critical lynchpins in a comprehensive disaster recovery plan.

"Every enterprise must develop plans and procedures to become a resilient organization," writes David Neil, editor in chief of the Enterprise Networking segment of Gartner, Inc.'s recent Spotlight series of reports on building resilient organizations. "Not having such a strategy places the enterprise at enormous risk and could leave it in a situation from which it may never recover."

## **Building in Resiliency**

From an IT perspective, reducing the risk of a business-threatening event starts with designing a network that provides for high availability, with no single point of failure and rapid recovery times.

Guaranteed access to data is another must, one that is driving many enterprises to build SANs and NAS facilities. In either case, a geographi-

cally separate backup storage facility, if not an entire backup data center, is required.

This presents a challenge for many enterprises given the vast difference in bandwidth typically available in a LAN environment vs. a MAN or WAN. Enterprises can meet that challenge using optical technology, lighting up dark fiber or individual wavelengths to construct a metro IP network that provides the high bandwidth and network resiliency that applications like storage require.

"The CISCO COMET portfolio is designed to keep business operations functioning in the event of a failure, with the ability to recover from a fiber outage in less than 50 ms," says Chris McGugan, senior manager, technology marketing for Cisco. "We've spent time with companies like IBM and EMC in getting Cisco optical solutions certified for deployment with their storage systems, so that we meet their latency and distance requirements."

Cisco has also worked to ensure that all the benefits inherent in its Architecture for Voice, Video and Integrated Data (AVVID) extend to Cisco COMET. AVVID is a framework for leveraging the intelligent network features inherent in the Cisco IOS and Catalyst operating systems to provide security features such as authorization, authentication and accounting. AVVID also addresses performance issues, providing load balancing and advanced quality

## **Learn more about optical networking:**



# to Resiliency

for network reliability, flexibility and disaster recovery.

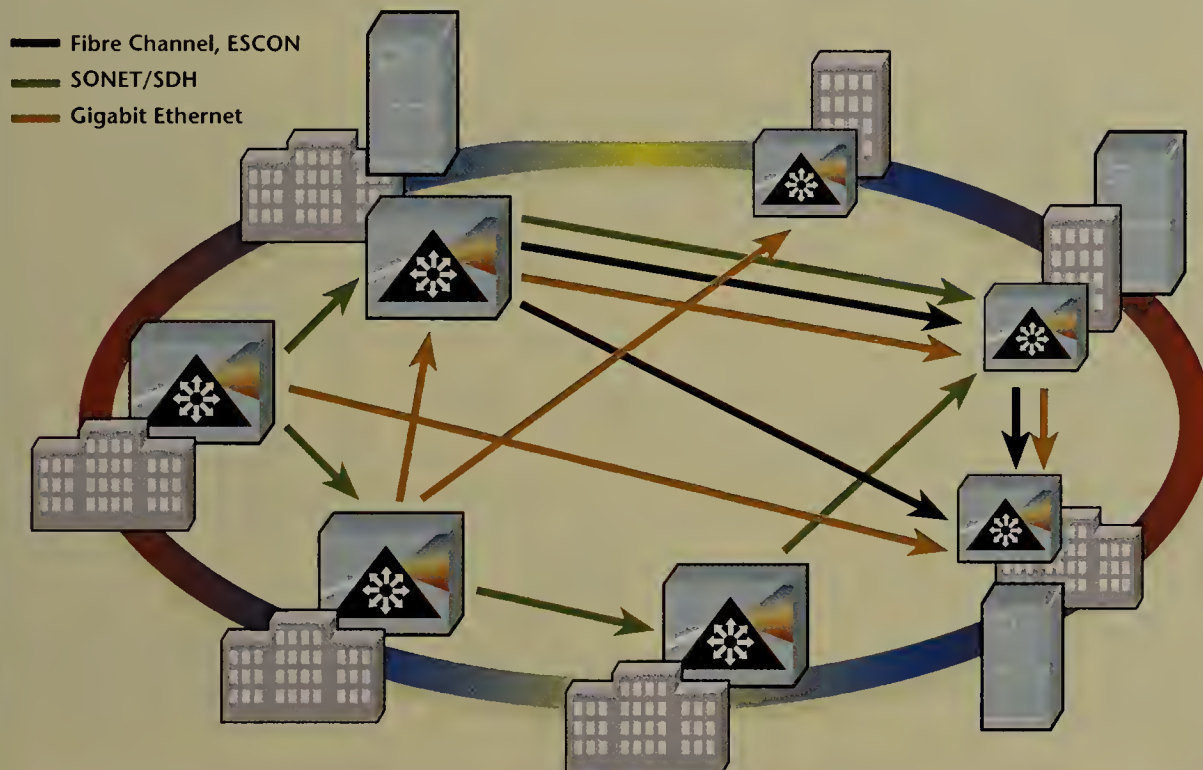
of service (QoS) features. The net result is that every application – be it voice, data or video – gets the network performance it requires.

Now a customer's existing Cisco enterprise networking solutions can tie in to an optical infrastructure, while maintaining all the security and performance monitoring features embodied in Cisco AVVID. So customers not only get massive amounts of bandwidth, they get bandwidth that is application-aware.

Cisco COMET delivers on the well-known fault-detection and traffic re-routing capabilities of SONET, but goes a step further by providing support for the emerging Resilient Packet Ring (RPR) standard, which is based on Dynamic Packet Transport technology developed by Cisco. Both SONET and RPR networks can route around failures in less than 50 ms, but RPR offers more flexibility and a lower entry cost, McGugan says. Instead of installing a SONET multiplexer at each location, enterprises

## A Resilient Enterprise Built on DWDM

The Cisco COMET portfolio includes DWDM solutions that enable network consolidation over a single multiservice, optical infrastructure that offers scalability, flexibility and resiliency.



can terminate an RPR connection directly into their Cisco COMET devices or other Cisco equipment such as the Catalyst 6500 and Cisco 7600 Series router. RPR offers another advantage in that it doesn't require users to reserve extra bandwidth to be employed in case of a failure of the primary path, as does SONET.

Cisco COMET devices also perform extensive performance monitoring, such as by checking bit error rates and detecting Cyclical Redundancy

Checking (CRC) errors that indicate signal degradation. That enables the devices to automatically switch traffic to a backup path when the primary is not performing properly.

In short, enterprises are finding that converging their voice, video, data and storage networks over a single high-performance optical network can not only provide cost savings and simplified network management, it can be an important part of their business resilience strategy.

Download the white paper, "Cisco COMET: Optical Networking Solutions for the Enterprise," from: [www.nwfusion.com/gocc/brwp2](http://www.nwfusion.com/gocc/brwp2).



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## Easing the storage burden



Storage, with its wildly growing volumes, can quickly overwhelm even the most prepared network professional. An overburdened

storage architecture can crush productivity and efficiency even before you realize you've got a problem.

Easing the storage burden is going to take unprecedented industry cooperation. But we've seen promising signs. One worth noting is the teaming of 17 vendors to develop the Bluefin management specification, and the Storage Networking Industry Association's (SNIA) subsequent commitment to turn that spec into a full management standard.

In the offing is an interoperable management interface for Fibre Channel, network-attached and direct-attached storage devices — much like what SNMP provides for enterprise network gear. Storage managers surely would benefit from the ability to manage disparate vendors' storage devices from the same management platform.

So be sure to keep vendors honest in their support of Bluefin (now officially known as the Storage Management Interface Specification) or any other open management standard coming out of the SNIA. Insist they embrace the SNIA's work and that they prove themselves by participating in interoperability tests.

After all, with open management comes the ability to mix and match products to suit your needs, even if that product isn't from your primary storage vendor. And that will surely help keep storage issues from overwhelming you.

**Beth Schultz**  
Editor, Signature Series  
bschultz@nww.com

# Storage

## Picnic or panic?



KEN ROSS

## The ins and outs of interconnects

Understanding how to build a SAN means knowing your way around a maze of new protocols.



DANA EDMUNDS

## Distributed file system on tap

Technology that pools far-flung storage resources could be a long-awaited management life raft.



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## Bluefin on the management menu

This draft specification opens storage management and makes SANs more appetizing.



## Taking the tedious out of storage management

New-style automated hierarchical storage management products add more smarts to managing aging data.

*An editorial supplement to*

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Editor: Beth Schultz,  
(773) 283-0213; Fax: (773) 283-0214

Executive editor: Julie Bort  
(970) 468-2864; Fax: (970) 468-2348

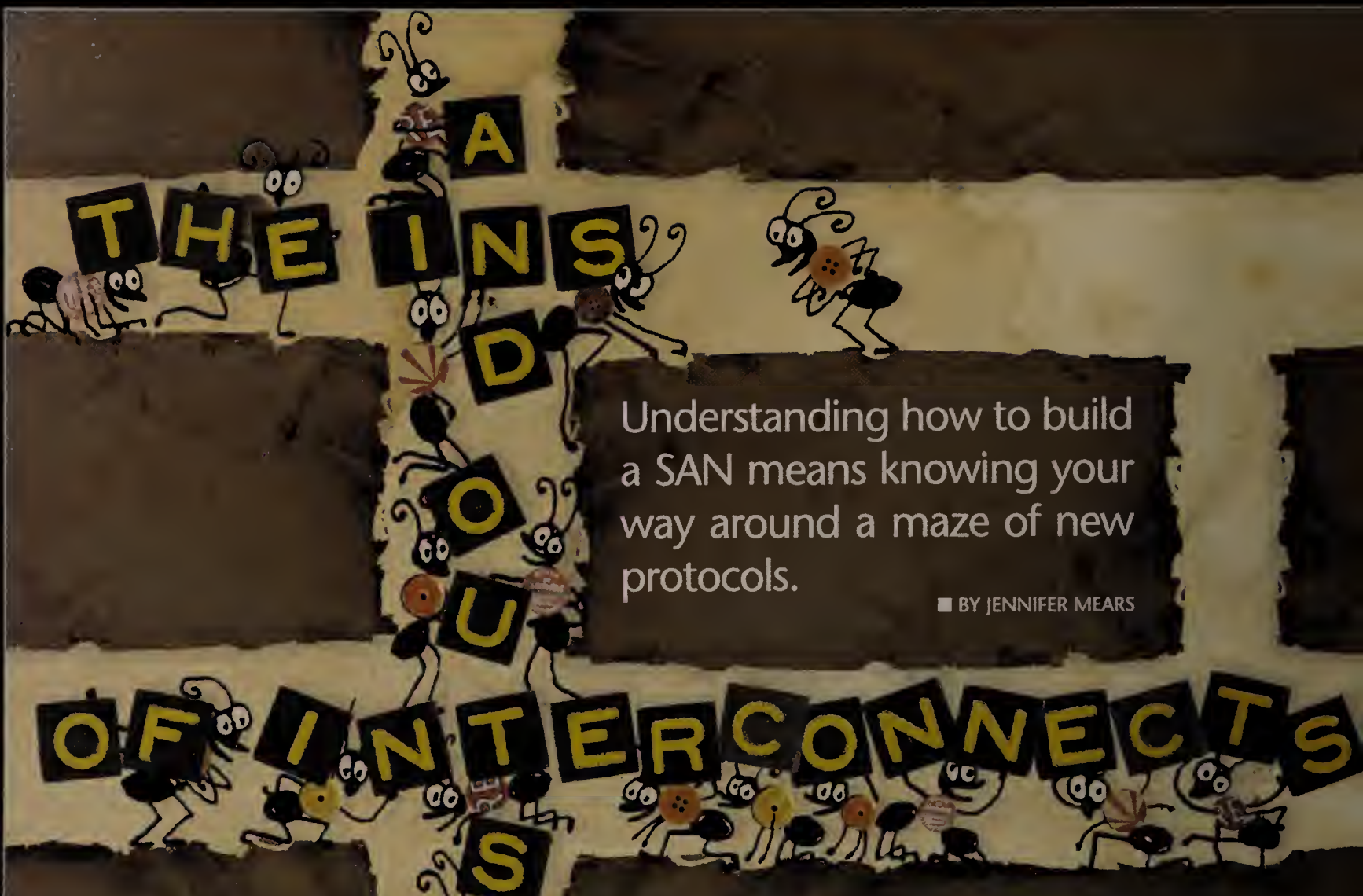
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Network World editor in chief: John Dix

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# A THE INS D O U OF INTERCONNECTS

Understanding how to build a SAN means knowing your way around a maze of new protocols.

■ BY JENNIFER MEARS

It used to be, if you wanted a storage-area network, you turned to Fibre Channel, the high-speed transport technology that moves SCSI traffic from servers to disk arrays and tape drives.

Now you have to sift through a veritable alphabet soup of storage interconnects to determine which best suits your SAN needs. You have iSCSI, Fibre Channel over IP (FCIP) and Internet Fibre Channel Protocol (iFCP) for pushing storage data over IP, and InfiniBand, a high-speed I/O switching fabric.

"The lines are blurring between what used to be the separate universes of storage, networking, clustering and I/O technology," says Karl Walker, a vice president of server strategy at Hewlett-Packard. "All of that stuff is

really starting to come together in interesting ways."

Interesting is one way to put it. Complex is another. In a recent survey of 96 network professionals who attended *Network World's* summer seminar tour, "Storage Town Meeting: Ensuring Business Continuity," 21% said they could see an immediate need for new storage interconnects but weren't sure what was available. Another 49% said they could see a future need but needed to investigate options (see charts, page 10).

Users should start their research with iSCSI, FCIP and iFCP. Storage vendors concocted these interconnect protocols in response to shortcomings of Fibre Channel. Fibre Channel networks require expensive dedicated fiber lines and specialized expertise and present a distance limitation that could be troublesome. Fibre Channel deployments cap off at about 10 km, a real problem when trying to set up geo-

graphically distributed storage for disaster recovery.

Vendors are embracing iSCSI, FCIP and iFCP in varying degrees, but haven't rallied behind one protocol yet. Some are hedging their bets with storage switches and other products that support the incumbent Fibre Channel and IP-based storage. "The industry has invested a lot of money in building Fibre Channel SANs. Fibre Channel is clearly going to remain the dominant force for the next half decade," says Jamie Gruener, a senior analyst with The Yankee Group.

On the plus side, this dual support lets users get a feel for new IP SANs without trashing existing Fibre Channel SANs.

iSCSI, FCIP and iFCP await standards ratification, as does InfiniBand. Until then, most enterprise users are watching, but not deploying, the protocols.

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existing strategies: Fibre Channel, direct-attached storage. But we are looking at iSCSI and InfiniBand to figure out where they're going to make sense," says John Blackman, systems architect in the emerging technologies and consulting group at Wells Fargo in Minneapolis. "

I can't say where they would actually be deployed because I don't think the industry knows yet," he adds.

work traffic, and security have been big concerns. And iSCSI hasn't made the inroads expected when it was introduced by Cisco and IBM in February 2000. Cisco and Nishan Systems are among only a handful of vendors offering iSCSI switches. Still missing are iSCSI storage arrays from vendors such as EMC and HP. IBM put a damper on iSCSI when it halted development of the 200i iSCSI target storage appliance it introduced in early 2001. Users wanted more power than provided by this "kick the tires" version, says Clod Barrera, technical strategy director for IBM Storage

age side, I don't see iSCSI happening, because the performance would be too poor," says Arun Taneja, senior analyst at Enterprise Storage Group.

Wireless Retail, a specialty provider of wireless services and products, ran into such performance problems with its iSCSI deployment. Like most small companies, Wireless Retail had been using direct-attached storage. Last fall, it was ready to move into more distributed, scalable storage. It chose iSCSI to avoid the typically big investment required for Fibre Channel.

"I wanted to utilize the storage for everything that it was worth, and that meant getting as many servers as possible connected and doing it as economically as possible," says George Nathanson, IT director at Wireless Retail, in Scottsdale, Ariz.

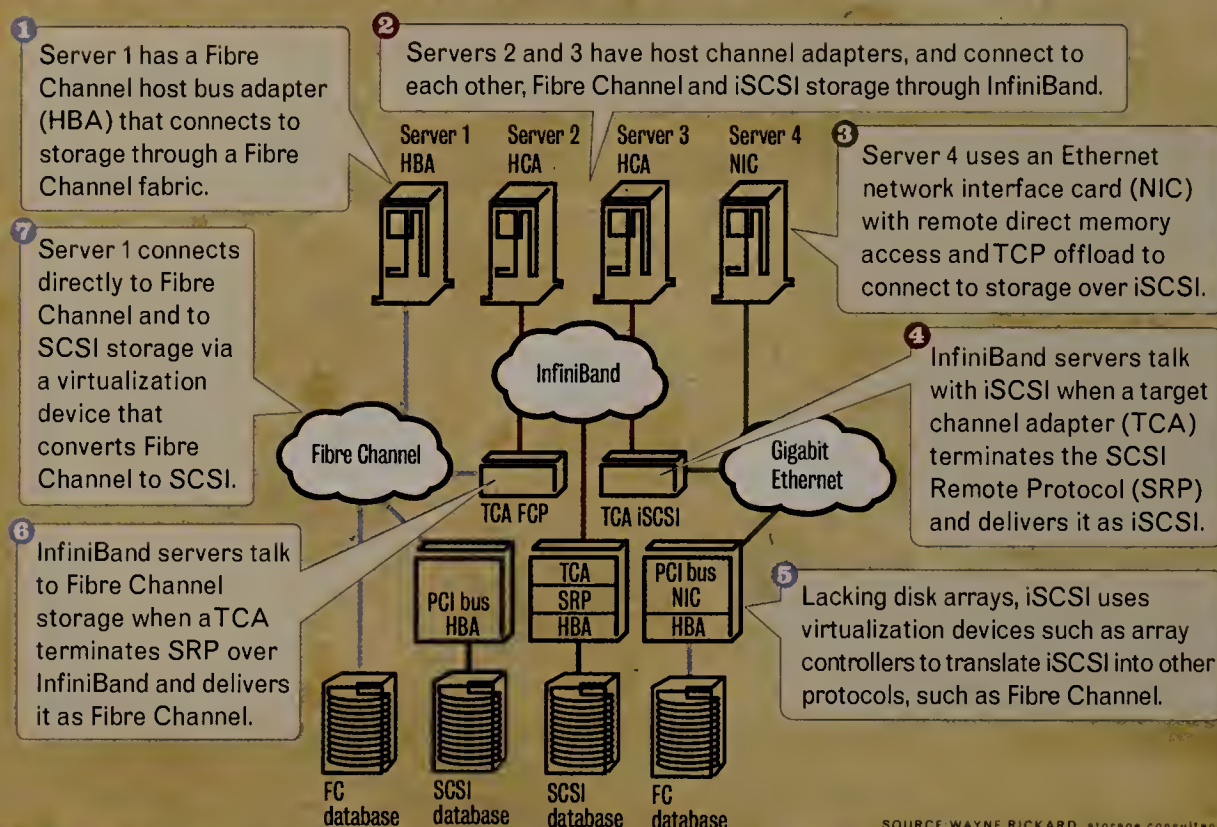
At the same time, Nathanson concedes that performance is one nagging concern of iSCSI. To address this, and fail-over, he opted for Fibre Channel to connect his SQL databases, which contain some of the more critical data in his storage setup.

## Freeing Fibre Channel

FCIP and iFCP may be the answers for companies that want to extend their Fibre Channel storage farther than 10 km. Each uses gateways to encapsulate Fibre Channel

## Storage interconnects in a SAN

This diagram of a hypothetical SAN shows the use of a variety of storage interconnects. Additionally, the Fibre Channel over IP and Internet Fibre Channel Protocol specifications would allow the extension of this SAN over distances greater than 10 km.



SOURCE: WAYNE RICKARD, storage consultant

## Sorting things out

To understand where each interconnect could be used, start by examining their differences.

iSCSI is a native IP interconnect that wraps SCSI data and commands in TCP/IP packets. This approach gives users full access to IP management and routing.

But latency, introduced when putting storage on the same route as other net-

Systems Group.

Users may get that oomph from TCP off-load engines (TOE), which off-load CPU-draining processes from servers. Companies such as Adaptec, Alacritech and Intel already offer TOEs for iSCSI, and others are expected to follow.

"Without TOEs on the host adapter side and on the stor-

commands into IP packets.

FCIP moves the encapsulated Fibre Channel data through a "dumb" tunnel, essentially creating an extended routing system of Fibre Channel switches. This protocol is best used in point-to-point connections between SANs because it cannot take advantage of routing or other IP management features. And because FCIP creates a single fabric, traffic flows could be disrupted should a storage switch go down.



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IFCP, on the other hand, lets users maintain the Fibre Channel architecture while gaining the benefits of IP networks. IFCP wraps Fibre Channel data in IP packets but maps IP addresses to individual Fibre Channel devices. That provides more stability than a tunneled FCIP deployment, some vendors say.

When iFCP creates the IP packets, it inserts information that is readable by network devices and routable within the IP network. "IFCP gives you visibility into the talking pairs between servers and storage and gives you a way to monitor discrete conversations between storage initiators and targets," says Tom Clark, director of technical marketing at Nishan, which supports iFCP, FCIP and iSCSI in its storage products.

Because the packets contain IP addresses, customers can use IP network management tools such as HP's OpenView to manage the flow of Fibre Channel data using iFCP.

Marketing, travel and hospitality conglomerate Carlson Companies, in Minneapolis, opted to use iFCP to extend the reach of its Fibre Channel direct-attached storage. It plans to eventually link the IP SAN to thousands of remote offices in more than 140 countries. It uses Nishan multiprotocol switches to convert data between Fibre Channel and IP. IFCP routes the Fibre Channel commands across the company's Ethernet LAN.

Gary Johnson, architectural consultant for Carlson Shared Services, says IFCP will let Carlson quickly extend its SAN

globally because it uses native IP management. He says companies should be aware that latency could be an issue once storage traffic moves outside a dedicated link.

"As long as you engineer and design

Systems support FCIP. Nishan is the primary vendor supporting IFCP.

## To InfiniBand and beyond

InfiniBand differs, at least for now, by being aimed at server processing. Portrayed as the fix for server I/O bottlenecks, InfiniBand connects server, storage and network devices at 2.5G to 30G bit/sec.

Current bus technology supports speeds up to 1G byte/sec.

But analysts don't see InfiniBand as an immediate SAN choice. "Over time, you may find that you can design a single InfiniBand fabric within a data center and basically run storage traffic on it

as well," says Enterprise Storage Group's Taneja. "Conceptually, you could build a SAN with InfiniBand rather than Fibre Channel. But that's definitely a ways out."

Most storage vendors are holding off on InfiniBand plans until the market settles. Storage software maker Veritas Software, for example, went into a wait-and-see mode after Intel's late May announcement that it would not ship InfiniBand chips as planned in 2003, says Ruth Colombo, product manager for network storage at Veritas.

So it seems that Fibre Channel will not be quickly unseated. Rather, a number of protocols will each have a place in the storage architecture. ■

George Nathanson,  
IT director  
at Wireless Retail,  
sees  
iSCSI as an  
affordable  
SAN.



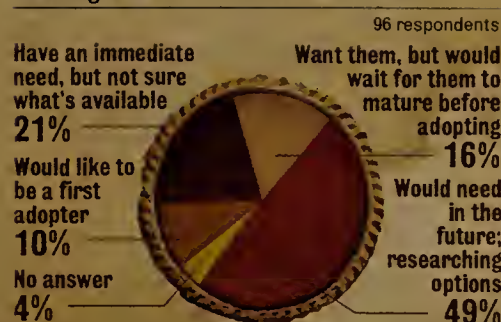
your network to support a storage application, rather than a messaging application, it's going to work just fine for you," he says. "As soon as we leave [our dedicated storage] network to go to a remote location, we certainly expect that we'll be using [quality of service] to manage that."

The biggest downside with Fibre Channel-based IP deployments is that they still require the expensive Fibre Channel back end. Vendors such as CNT, EMC, Pirus, SANcastle and SAN Valley

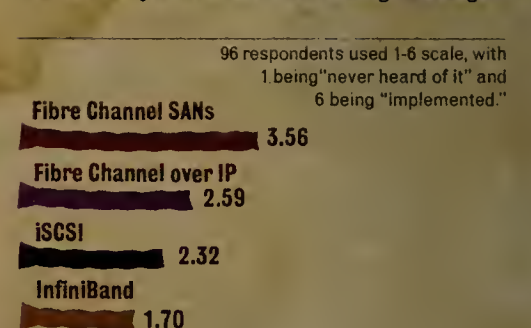
## Interconnection confusion

In a recent survey of network professionals attending Network World's summer seminar tour "Storage Town Meeting: Ensuring Business Continuity," here's how respondents answered these questions:

What do you think about storage interconnection technologies like iSCSI and Fibre Channel over IP?



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# Distributed file system on tap

Technology that pools far-flung storage resources could be a long-awaited management life raft.

■ BY MARY RYAN-GARCIA

With corporate storage pools springing up all over, one of the most tantalizing new management ideas is the distributed file system. A DFS manages multiple, geographically dispersed storage devices, including Fibre Channel and network-attached storage servers. A variety of start-ups and traditional vendors are developing products, pitching IT managers on the ability to scale storage capacity and performance at will.

For example, start-up Zambeel offers Aztera, a distributed NAS file system that will let users consolidate multiple users, departments or projects within a secure storage infrastructure. And Acirro, another start-up, offers Acumula, software that lets users combine data across storage devices, networks and formats.

Other DFSs for storage contenders include 1Vision, Advanced Digital Information Corp. (ADIC), DataCore Software, Scale Eight, Z-Force, and traditional vendors such as IBM Tivoli, LSI Logic, Silicon Graphics, Sun and Veritas Software.


It seems such product development comes none too soon. Users have

been waiting for DFS for the last five or more years, chiefly on the promise of unlimited scalability and more balanced storage workloads, says Arun Taneja, a senior analyst with the Enterprise Storage Group. "Managing different computers, each with its own file system instance, and its own storage is a lot harder than if there was a solid, interlocking file system that ran on the cluster. This is particularly true for a single application, such as e-mail," he says.

If you run out of capacity in a traditional direct-attached storage environment, you have to bring the server down and add more, Taneja says. If you run out of compute power, you either buy a larger server or add another one and split your application and data. "Either way, you have to bring your systems down," he says. "What a pain from a user [perspective] and from a storage management perspective."

Although DFS players take slightly different approaches in their products, each presents one file system image to the application server or client seeking file services, Taneja says. Instead of being serviced via Network File System from three NAS servers today — and thus having at least three file systems mounted to your NFS client software — you would only have one mount point to the DFS. "This alone would make your IT administrator's life significantly easier," he notes.

For DFS to interplay effectively with the various file systems that come with NAS devices (NFS for Unix boxes and Common Information File System [CIFS] for Microsoft servers), vendors tweak



Brian Chee, an IT director at University of Hawaii, finds an ocean of storage management opportunities with distributed file systems.

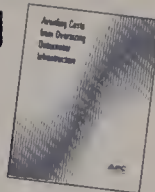
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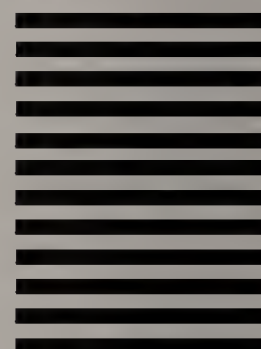
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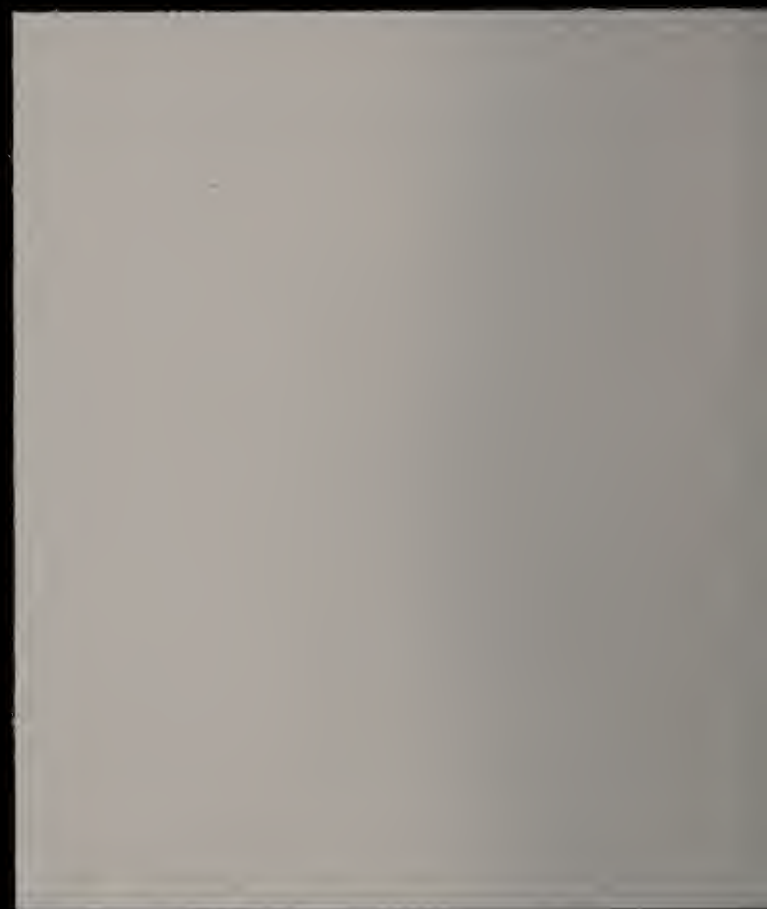
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the technology in myriad ways for maximum storage performance, says Mike Kahn, chairman of The Clipper Group, a technology acquisition consultant. "In one instance, a singular file system takes over for many servers. In others, a metafile server 'floats' overhead," he says. "Others use an installable file system or stub to replace the operating system's native file system."

Whatever the technique, many users find promise in the idea of centralizing storage resources in a single pool. In a recent survey of 96 network professionals attending *Network World's* summer semi-

"Instead of forcing the students to wait for a long download . . . DFS provides a way for faculty to drop their material onto locally mounted devices."

— Brian Chee, IT director at University of Hawaii

nar tour "Storage Town Meeting: Ensuring Business Continuity," two-thirds of respondents said they do not yet have geographically dispersed NAS and storage-area network (SAN) environments. But of those who do, the desire to manage them as a single storage pool was nearly unanimous (see graphic, page 16).

## DFS education

Such is the case at University of Hawaii (UH), in Honolulu, which has been using Acirro's Acumula DFS software in a pilot program launched in April. The pilot enables sharing of educational materials among 10 UH campuses, across four islands, letting students participate in classes regardless of their physical location, says Brian Chee, a systems programmer and associate director in the university's Advanced Network Computing Laboratory. The program also enables information sharing among UH and Hawaii's K-12 schools.

The Acumula smart replication and storage management software is based on Acirro's Global Distributed File System technology. The software lets users combine data across storage devices, networks and formats. They can aggregate diverse NAS and SAN devices regardless of physical locale, and get one view of storage files.

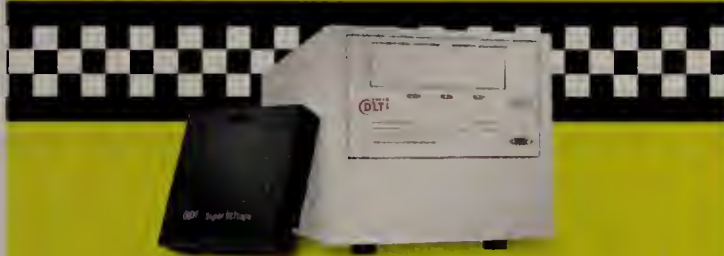
"Server aggregation seems to be a pretty good driving force," Chee says, pointing out that his department has collected a variety of stand-alone servers, ranging from Windows 2000 running Microsoft's CIFS, Unix boxes running NFS and "dumb" NAS boxes.

"Going to a system that will present all of our data on a single login is a good thing," he says. "This type of system also allows me to further hide the NFS boxes behind firewalls and get quite a bit more aggressive on firewall rules."

UH hasn't yet decided to roll out DFS beyond the pilot program, but has seen operational improvements. For example, Chee says the DFS has reduced the amount of human intervention traditionally necessary to synchronize local Web and FTP storage of classroom support materials.

"Some materials, such as video [and] compiled Java libraries, can become quite large," he says. "Instead of forcing the students to wait for a long download over the WAN link between campuses, DFS

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provides a way for faculty to drop their material onto locally mounted devices. They can expect the material to show up on outer-island campuses without human intervention," he explains.

Chee adds that DFS for storage works well with the file systems that come with NAS devices,



## Diving into DFS

A variety of vendors are developing distributed file systems for storage. Here is a sampling:

| Vendor            | Product                      | Description  |
|-------------------|------------------------------|--|
| Acirro            | Acumula                      | Global DFS, with embedded NAS aggregation, automated capacity management and smart replication.      |
| DataCore Software | SANsymphony                  | Open storage management for homogeneous and heterogeneous IT environments.                           |
| LSI Logic         | TotalNET Advanced Server 7.0 | Converged NAS and SAN infrastructure enables seamless access to block- or file-oriented information. |
| Scale Eight       | Distributed Storage Software | Storage platform for creating scalable, single-image NAS pools.                                      |
| Zambeel           | Aztera                       | Enterprise-class NAS product with scaling and resource provisioning.                                 |

including NFS for Unix boxes or CIFS for Microsoft servers. "The promise is tremendous," he says. "I will eventually have a mix of both Active Directory and NFS/NIS authentication. This system will allow me to front-end both environments and allow me to integrate both together for the first time. It is going to make it possible to consolidate servers logically so that my less-sophisticated users can stay in their native environment instead of having to eat the learning curve for something new."

Other DFS tools also are geared toward heterogeneous environments. ADIC's CentraVision 2.0 software, for example, is intended to let heteroge-

neous clients share files across high-speed storage network connections. ADIC says with CentraVision, users can share storage resources among Linux, Windows and Unix servers so all storage looks native to all hosts. The file system "owns" the storage and replaces individually managed volumes and NAS devices. For example, data on

over NAS and SAN devices, can stir up choppy intercompany political waves over ownership.

UH's Chee can see the potential difficulty. "At this moment, management of my lab servers [Active Directory] and my Unix machines [Lightweight Directory Access Protocol] is not run by the same person," he says. "While such a move is possible — integrating two relatively independent groups will be a challenge."

Even so, Chee is eager to tap into the DFS storage pool. He predicts that even if there's a DFS collision of sorts between his more "backroom" Active Directory folks and the Unix folks who like to mix more with the UH faculty, everyone will eventually learn to swim without drowning. "I can still see such integration as being possible and good for the department in the long run," he says.

*Ryan-Garcia is a freelance journalist in Coram, N.Y., specializing in the storage industry. She can be reached at [freshcontent.com](mailto:freshcontent.com).*

a Fibre Channel disk, is shared through servers to many hosts without separate controllers.

But Clipper Group's Kahn cautions enterprise users to take care when deploying DFS in multivendor, multiplatform environments. "DFS products tend to work best in homogeneous environments; for heterogeneous environments, they tend to be immature and not high-performing," Kahn notes.

## The politics of DFS

Network professionals who want to try DFS storage software must navigate more than the waters of new technology. DFS, because it layers a file system



### More online!

Barry Lynn, management consultant, venture capitalist and former CIO of Wells Fargo and Company shares his thoughts on the future of DFS for storage.

**DocFinder: 2121**

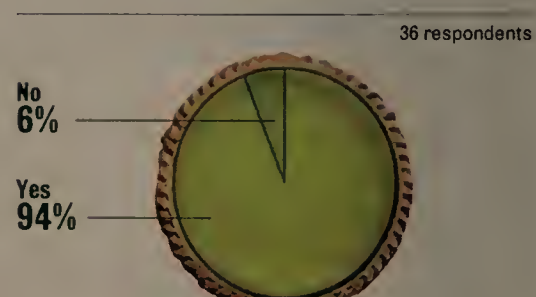
## DFS in demand

In a recent survey of network professionals attending Network World's summer seminar tour "Storage Town Meeting: Ensuring Business Continuity," here's how respondents answered these questions:

Do you have geographically dispersed NASs or SANs?



Would you like to manage these as a single storage pool?





# Bluefin

## on the management menu

This draft specification opens storage management and makes SANs more appetizing.

■ BY DENISE DUBIE

Rick Bauer knew he needed the power and speed of a storage-area network to back up the 3 terabytes of content a new online learning environment would require, but he had a few reservations about committing education dollars to a SAN.

"I wanted to make sure we weren't investing in something that, down the road, would make us an island," says Bauer, who is CIO at The Hill School, a private high school in Pottstown, Pa.

Until recently, The Hill School mostly used network-attached storage devices. And although Bauer says the idea of a high-speed SAN interconnecting disparate data storage devices appealed to him, vendor-specific management tools weren't in the budget.

"We didn't really have an incremental growth path for storage or the financial justification for a SAN," Bauer says.

But recent developments changed Bauer's mind. Encouraged in large part by the Storage Network Industry Association's (SNIA) work on a multivendor management specification, next week Bauer is rolling out a SAN at The Hill School. He will manage the SAN via Hewlett-Packard's OpenView network management software.

Because he sits on the SNIA Customer Executive Council, Bauer got a sneak peek this summer at the draft specification, dubbed Bluefin. "This wasn't slideware. These were things being hammered out,"

he says. "Bluefin is about real interoperability. It's more than something bolted on something for marketing."

### Biting into Bluefin

Bluefin provides a method for managing, configuring and securing distributed, multivendor storage resources in

a SAN via a common messaging interface. Vendors supporting Bluefin would open their APIs so storage managers could tap into management data from any compliant storage resource.

Ultimately, open management will let customers pick and choose products from multiple vendors for their SANs, proponents say.

While efforts to develop a common management interface for storage began in 1999, only in May did that group of 17 storage vendors — called the Partner Development Process (PDP) — hand their draft specification over to SNIA for finalization.

In August, the SNIA formally accepted Bluefin, renamed it the Storage Management Interface Specification and created the Storage Management Initiative to spearhead ongoing development. SNIA aims to turn Bluefin — as it continues to be informally called — into a fully accredited standard.

The SNIA plans to demonstrate Bluefin-compliant products at the Storage Networking World conference in October. Product are expected to start shipping in early 2003.

That's good news for many enterprise users. In a recent survey of 96 network professionals attending *Network World's* summer seminar tour "Storage Town Meeting: Ensuring Business Continuity," 68% said they'd like to see their storage vendors comply with Bluefin. And 22% said they would insist on it.



Rick Bauer, CIO of The Hill School, highly anticipates digging into Bluefin-compliant SANs.

BILL CRAMER



"The real dream of SANs for end users is that a set of vendors could walk in and plug SAN management into their data center, wire together all the computing and storage resources, and start the practice of sharing those resources," says Roger Reich, PDP chair and a senior technical director. "The storage industry has finally figured it out. If we don't work together, customers are not going to buy SANs."

## Tough to chew

Bluefin is built on the Distributed Management Task Force's Web-based Enterprise Management initiative, which includes the Common Information Model for managing network infrastructures, along with a data model, a transport mechanism that uses HTTP and encoding that uses XML. By tying these tools together, Bluefin would help storage administrators collect and view data from different vendors' storage resources in the same format, and ideally, would let storage managers manipulate SANs from a centralized location.

Bluefin, installed as agent software or software on a proxy server, would let management software retrieve data and take the necessary action to reallocate resources or lock down a device when multiple applications are trying to access the device (see story, right). For example, Bluefin agent software in a host bus adapter would enable a storage application to discover, manage and control the adapter's resources and apply them where needed throughout the SAN.

While Bluefin looks good on paper, some industry watchers aren't sure how it will work in practice. They wonder how far vendors will go to interoperate and are worried that some vendors will

tack extensions onto the specification that would let them better manage and differentiate their storage products. Doing so would obviously make multi-vendor management more difficult, and the idea of a common management interface is still elusive.

Others are worried that Bluefin will not provide adequate management capabilities. That's the concern of Chris Bartram, senior HPe3000 systems administrator and a consultant for the U.S. Mint in Washington, D.C. While not familiar with Bluefin, Bartram says he's worried a "common denominator" provided by standards-based tools would "dumb down" management interfaces.

"I'd be worried that we'd lose access to some of the differentiating factors that caused us to choose one vendor's product over another's in the first place," Bartram says. But he adds that he would be interested in seeing network management companies such as HP and IBM Tivoli adopt Bluefin if it does become a standard. Then SAN management simply could become an add-on module, he says.

Other industry watchers think Bluefin stops short in supporting only SANs. "The industry has to recognize that storage is storage no matter what the line protocol looks like," says Bob Zimmerman, a vice president at Giga Information Group. He says the type of network — Fibre Channel, Ethernet, TCP/IP — shouldn't matter to a common storage management interface. But Bluefin could eventually be extended to support network- or server-attached storage devices, Reich contends.

Yet, Zimmerman says he's excited by Bluefin's potential to give users broader access to their storage resources, to give them more flexibility in purchasing

## The Bluefin base

The proposed Bluefin specification has a strong base in Distributed Management Task Force and Internet Engineering Task Force developments.

Bluefin:

- is built on the DMTF's Web-based Enterprise Management initiative, which includes the Common Information Model for managing network infrastructures, along with a data model, a transport mechanism that uses HTTP and encoding that uses XML.

- uses the open management capabilities found in the IETF's long-standing and much used SNMP, but aims to go beyond passive monitoring to actual control.

- includes the IETF's HTTP digest access authentication and transport layer security protocol.

- supports the IETF service location protocol for discovery and configuration of network devices and capabilities.

— Denise Dubie



Get more information on Bluefin's standards base.  
DocFinder: 5983  
[www.nwfusion.com](http://www.nwfusion.com)

product, to reduce their management costs and to help them more efficiently use their storage capacity.

The Hill School's Bauer is hooked on those promises.

"I look on with anticipation, and I'm probably not going to be the first customer," Bauer says. "Yet I was amazed at the specifics Bluefin seemed to address. Maybe the talk and hyperbole of two years ago has given way to reality." ■

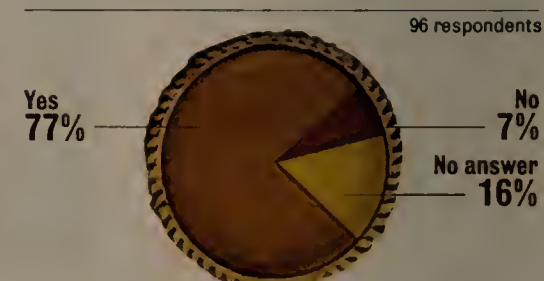
## Bluefin believers

In a recent survey of network professionals attending Network World's summer seminar tour "Storage Town Meeting: Ensuring Business Continuity," here's how respondents answered these questions:

If Bluefin becomes a standard, how would it impact your storage buying decisions?



Would you like to see Bluefin extended for NAS, DAS and other storage?





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Anne Skamarock is Senior Analyst at Enterprise Management

Associates, and co-authors Network World's Storage in the Enterprise newsletter. For over 15 years, Skamarock has served in technical, marketing, and consulting positions within the computer industry. Her expertise consists of tape and disk storage systems, enterprise management software, data protection solutions, and storage networking.

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# Taking the tedious out of storage management

New-style automated hierarchical storage management products add more smarts to managing aging data.

■ BY DENI CONNOR

What once was old is new again with policy-based storage management software. It could change the way companies think about how they store, archive, back up and recover corporate data.

This new breed of storage software takes the concepts introduced with traditional hierarchical storage management (HSM) tools and extends them. Not only will this software increase the utilization of storage, reduce back-up and recovery times and archive data, but it also will manage the hierarchy of data from its creation.

With this automated storage management software, IT managers will no longer need to devote hours — if not days — to moving aging data from expensive, enterprise storage arrays to less-expensive, near-line tape or offline, archival media. They won't have to write scripts to identify what data needs moving, or groom disks constantly to eliminate files that are no longer required by law or company policy. And gone will be the days spent culling data from disks because drives have reached their capacity or redistributing data to other disks to achieve maximum use.

That's not all. Automated storage management software extends the reach of traditional HSM tools by looking at data in use and, following set policies, making deci-

sions on how applications or business processes are tied to the data.

Such tools will become increasingly desirable as users struggle to cope with unwieldy — and costly — data stores, says Jamie Gruener, senior analyst with The Yankee Group. The Yankee Group estimates the market for automating the provisioning of storage for apps at \$500 million by 2005.

"The fact that storage is such a growing part of the IT budget will force customers to find ways to track storage automatically [starting] at the application and business level," Gruener says. "Once a customer knows the storage requirements each specific application needs, rolling out applications can become an automated task, saving precious personnel time spent on doing this function manually."

Automation by application works in provisioning, resource management, back up and recovery, and the archiving of data.

## Attorney privilege

New York law firm Weil, Gotshal & Manges sees promise in such tools for archiving

e-mail attachments, for example.

"Being a law firm, a lot of stuff that used to come by FedEx is now coming by e-mail," says Steve Kedem, senior network engineer with the firm who manages 8 terabytes of data on Hewlett-Packard, Hitachi and MTI storage. "The volume of data we are getting is growing exponentially ... because of attachments," he says, noting that data is replicated to other locations as many as four times for fault tolerance.

And Kedem sees no end in sight. He anticipates the amount of stored data will only increase because law firms may be required to archive mail for seven years. So the firm is evaluating products that would let it separate attachments and store them centrally, thus saving disk space, Kedem says. He is looking at policy-based e-mail archiving products from FalconStor Software, IBM, Legato Systems and Sun that migrate messages to tape after storing them on disk for a specified amount of time.

"We are looking at software now that will not only consolidate [mail] but automatically archive it. The key is to make it all transparent to the user," Kedem says.

Traditional HSM, while automating data backup, recovery and archiving, doesn't touch data that is still being managed as part of an application, even if that data





hasn't been accessed in a certain amount of time. HSM can't predict that a disk drive failure will interrupt an application. It can't retain data from a specific application based on rules that say it must be archived on nonrewritable media because of a federal regulation.

Brent Hawkins, network administrator for Earl Walls Associates, an architectural and engineering firm in San Diego, knows the limitations of traditional HSM. He uses Computer Associates' HSM for NetWare and CaminoSoft's Highway Server software to store files associated with completed laboratory design projects. But he'd like greater flexibility in the type of files migrated.

"We have a volume with thousands of project directories. Under these projects is a set of directories, with one being an 'archive' directory. With the CA software, we set up a policy to migrate files within this directory only," he says.

Now Hawkins is looking into new policy-based storage management tools that would set policies for moving data based on project status.

HSM hasn't evolved in the open systems arena, either. In this environment, when more storage is needed,

IT managers tend to buy more inexpensive disk arrays. They don't cull data out or migrate it to less-expensive devices.

Even Kedem is tempted by the allure of inexpensive disks.

"Disk is becoming so cheap, it is almost worth it to keep it on disk," he says.

But buying more disks compounds the storage management problem. As disk capacity grows, management headaches increase. Managing all the storage and making good decisions on where it should reside is getting too complicated and taking too much time to do manually. Data that hasn't been accessed in a year is being kept on enterprise arrays, taking up space that data generated by business-critical applications needs.

"Most shops put data on a box, and it stays there effectively forever, whether or not the value of that data merits being on that resource any longer," says Steve Duplessie, senior analyst with Enterprise Storage Group.

IT managers stop only long enough to back up that data to tape, snapshot it to another disk or replicate it to an expensive disk in another location.

"Rarely do you see any true proactive

management, where shops scour the data they have on devices and move it to a smarter spot," Duplessie says.

### Storage provisions

Now with automated storage resource management and provisioning, IT managers can apply rules and thresholds to capacity and utilization monitoring and provision storage according to application need.

Products from start-ups such as ApplQ, Invio Software and CreekPath Systems examine how frequently data is accessed, the importance of the data to the business, and the time it takes to retrieve it. With these packages, a network manager could specify that a mission-critical Oracle database be recovered before any other application in the event of a failure.

Alternately, network managers could set policies granting more bandwidth for backups to mission-critical applications. CreekPath is one of the only start-ups shipping such a product. Its AIM software defines three types of policies: explicit, rules-based and constraint. Explicit policies are user-definable rules affecting specific parameters such as RAID levels. In an



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explicit policy, a volume might be mirrored remotely to another device to ensure availability. Rules-based policies invoke a specific user or system action when an event occurs. For instance, AIM will notify administrators when a drive is underutilized so they can shift storage to it. Constraint-based policies put limits on a device — if the device is used, it also must be mirrored to a remote array for fault-tolerance.

But storage management companies such as BMC Software, CA and IBM Tivoli are getting into the game, too. BMC offers automated storage management with its Application-Centric Storage Management initiative, and CA and EMC promise such capability by yearend. Meanwhile, Tivoli has promised to announce a policy-based storage resource management package later this month.

### Fast recovery

Automation is being applied smarter than ever before to the back-up and recovery process, in an effort to address rising concerns about business continuity borne out of the Sept. 11 tragedy. In a recent survey of 96 network professionals attending *Network World's* summer seminar tour "Storage Town Meeting: Ensuring Business Continuity," 41% said they are currently upgrading or plan to upgrade their business continuity plans, while 24% said they revised their plans within the last six months.

Start-ups such as Avamar Technologies are developing policy-based software that saves data to inexpensive disks rather than tape, thus speeding the back-up and recovery process and shrinking the amount of time a customer must reserve for backup.



### More online!

Data is created, then provisioned and managed, protected, distributed and migrated, preserved and, finally, deleted. Go online for a rundown on software for addressing various stages of data's life cycle.

**DocFinder: 2124**

Other vendors that have jumped into this arena include Atempo, EMC, Legato, Network Appliance, OTG Software, QLogic and Quantum with products that replace tape

with inexpensive Advanced Technology Attachment drives from which data can be recovered more quickly. Companies claim data is restored from disk as much as 100 times faster than tape.

Connected, a PC management and data-recovery company in Framingham, Mass., which backs up about 1 million computers for several large clients, has turned to EMC's Centera hardware and software for automated storage operations. The company is

replacing tape drives with Centera's inexpensive disk and using policy-based software to migrate data from primary Symmetrix storage to Centera after it reaches a certain age, says Tom Hickman, engineering operations manager.

"The data is stored first on Fibre Channel-

attached storage," he says. "The server has a threshold control [which is set in software] — say you allocated 100G bytes to store data on. When capacity reaches 85%, the migration utility sends the data automatically to a tape library or to the Centera."

Setting policies and then letting Centera and its software act on them saves Hickman from having to perform the tasks manually.

Automation is even coming to the process of back-up reporting. Backup-Report software from start-up Bocada gathers completion records from CA, HP, Legato, Microsoft and Veritas back-up software running on a network and compiles them in a single set of reports. BackupReport costs \$500 per server, and could save IT managers considerable time.

Some large companies run as many as 40 back-up packages, vendors say.

No doubt, policy-based automated storage promises to ease the management of rapidly growing and out-of-control media. When automation hits storage, users will have the luxury of setting policies and letting the system do the work. ■

## Considerations for data migration and retention

Analysts recommend that corporations decide when to migrate data to less-expensive disk or tape storage based on a number of factors:

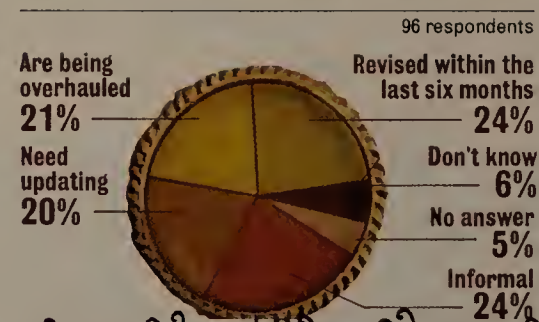
- **Application type.** You probably need to keep mission-critical databases online for years.
- **Age of the data.** If no one has accessed data for six months, consider migrating it to less-expensive media.
- **Data type.** Consider moving data such as digital X-rays that doesn't change but is still needed — what EMC calls static content — to less-expensive disk media.
- **Laws regulating data retention.** Consider if your company needs to archive e-mails or accounting data because of SEC rules or other regulatory requirements.
- **Network considerations.** Examine the cost per megabyte of storage, retrieval speed and capacity limits.

— Deni Connor

## Status check on business continuity

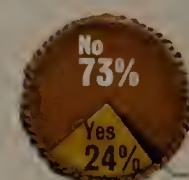
In a recent survey of network professionals attending *Network World's* summer seminar tour "Storage Town Meeting: Ensuring Business Continuity," here's how respondents answered these questions:

What is the status of corporate business-continuity plans?



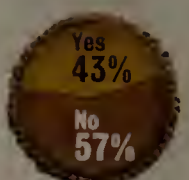
Do you use hierarchical storage management?

96 respondents



Do you use software that automates HSM?

23 respondents





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# Enterprise Applications

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## Voice systems go for a ride

High-tech giants blend voice-recognition software with car services.

■ BY DENISE DUBIE

Car shoppers test driving the 2003 Honda Accord this week need not worry about getting lost. If they do, all they have to do is say the word and the car will get them back on track.

The automaker will debut the 2003 EX model of the Accord, which along with new powertrain and side airbag features also includes what Honda calls its Touch by Voice voice-recognition system. The Accord, 2001's best-selling car in America with about 415,000 sold, features a touch-

panel display and in-car navigation system that the company upgraded to work with voice commands.

Telematics, or in-car communication technology, seems relatively new to most, and car makers around the world have made 2002 the year to unveil their network computing developments. Along with Honda's news, Toyota announced its G-Book Information Network last month. The subscription information network will offer services for PCs, PDAs and mobile phones starting Oct. 1. The company also plans to roll out a new vehicle model featuring an on-board G-Book terminal this fall.

### Voice evolution

Honda's voice technology is the latest development of car makers' next-generation Satellite-Linked Honda DVD Navigation Systems — with a technology contribution from IBM's Automotive and Telematics Solutions. IBM worked with Honda research and development to develop its Embedded ViaVoice technology and software to support the car dealer's online navigation system.

"Telematics is part of how the computing world is evolving," says Raj Desai, director at IBM Global Automotive and Telematics Solutions. "In the future, cars will be connected to networks, and users won't be able to distinguish the difference between connecting from their office, their home or their car."

Telematics enables hands-free and voice-activated commands, in-car computing, wireless Internet access and emergency location-based services. The technology used for telematics combines the

See Telematics, page 32

## Start-up preps Web optimization service

Netli aims to speed application response times over 'Net.

■ BY ANN BEDNARZ

PALO ALTO — Internet infrastructure start-up Netli is working on a way to help companies speed delivery of Web content to their far-flung remote users and business partners.

The company will deliver a service that provides remote users subsecond access to centrally located corporate applications, such as a salesperson searching for order histories contained in a CRM application or a supplier tapping into a retailer's systems to monitor inventory levels.

While the company declined to comment, its Web site states the service won't require companies to buy hardware, modify Web pages or install server software. Netli says it will deliver the service via a distributed network of clustered servers. The service network is compatible with content delivery networks and can work alongside caches and server accelerators, Netli says.

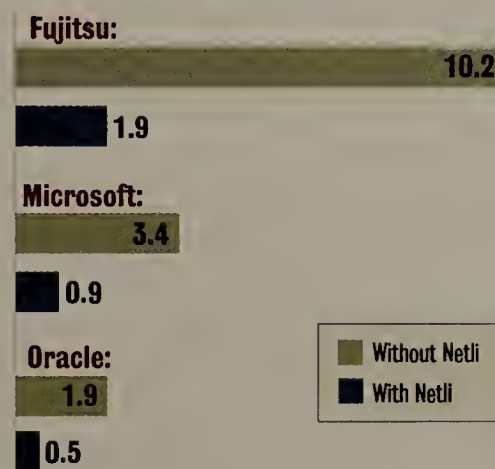
Netli's service will differ from that of content delivery specialists, such as Akamai Technologies, which focus on speeding delivery of static content, Netli says. Its service will optimize static and dynamic content generated by databases, query responses and interactive application services. Response times for data generated on the fly and delivered over the Internet purportedly will rival those that locally hosted Web applications achieve.

Peter Christy, co-founder of NetsEdge Research Group, says there's a real need for tools to improve Internet performance. Users have grown accustomed to eight-to

### Download performance

Netli measured Web page download speeds for Fujitsu, Microsoft and Oracle over an average 12-hour period, with and without its performance-enhancing service.

Web-page download speeds in seconds.



11-second response times, he says.

Indeed, Keynote Systems in its Web Broker Trading Index tracks average response times for creating a standard stock-order transaction on selected brokerage Web sites. During a one-week period in August, the average was 9.25 seconds.

"The Internet itself — the routers and communication lines — aren't going to get better in a way that fixes performance any time soon," Christy says. "Clever system technology will be where the performance improvements come from, primarily."

As an example, Christy cites Akamai, which has shown that relatively simple system technology can make an enormous

See Netli, page 30

■ Online collaboration vendor **eRoom Technology** has upgraded its **eRoom .net** hosted online workspace software to include real-time meeting services and built-in features to support intercompany business process workflow. The real-time capabilities of eRoom.net 6.0 let users launch an instant collaborative session around a certain application such as Microsoft PowerPoint. The business process mechanism provides new approval, management and review capabilities. The software, which also has a new interface, is targeted at groups that need online collaborative workspaces on a project-by-project basis. The hosted software is priced on a per-eRoom basis and starts at \$300 per eRoom.  
[www.eroom.com](http://www.eroom.com)

■ Announced last week, a new version of **Epicor Software's Clientele** customer service software is among the first CRM products built around Microsoft's .Net framework. Created using Microsoft's Visual Studio .Net, Clientele Customer Support 8.0 is the first module in a CRM suite Epicor is revamping to take advantage of .Net features, including the platform's XML support and intended facilitation of Web services deployments. A component of Epicor's 11-year-old Clientele software portfolio, Clientele Customer Support manages customer-service communications, including tools for call management, order tracking and billing. Next is a customer self-service portal that will replace the application named ClienteleNet. The .Net version of the software is scheduled to enter beta testing later this month. By the end of next year, all of Clientele's CRM suite will be moved to .Net and rereleased, the company says. Clientele Customer Support works as a stand-alone application or as part of Epicor's broader Clientele CRM software package. Customers with maintenance contracts will receive the software upgrade free. Pricing starts at \$1,500 per user.  
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### More online!

In addition to voice recognition, automakers are making strides in e-business. See their plans for the future.

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# IntruVert inspects high-speed IP traffic

■ BY ELLEN MESSMER


SAN JOSE — Start-up IntruVert Networks last week took the wraps off a new line of intrusion-detection systems that can reliably inspect high-speed IP traffic flowing through a system without encountering problems such as inaccurately replicating traffic or missing attack streams.

Packet loss and other failures are not uncommon with high-speed intrusion-detection systems, which have to duplicate traffic to analyze it. However, beta-test users who deployed IntruVert's IntruShield 4000 appliance, which supports a maximum 2.2G bit/sec of traffic, and the IntruShield 2600 appliance, which reaches 600M bit/sec, say the intrusion-detection system doesn't falter at high speeds looking for about 800 different types of hacker or denial-of-service attacks.

Although vendors of gigabit-speed intrusion-detection systems continue to improve product performance, the track record of the way a gigabit intrusion-detection system behaves at high speed has not been good. Most products have simply not worked as intended over a particular speed, perhaps 600M bit/sec or even as low

## High-speed detection

**IntruVert is introducing intrusion-detection appliances that can support up to 2.2G bit/sec traffic speeds.**

| Product  | Price     |
|--|-----------|
|  IntruShield 4000 | \$100,000 |
| IntruShield 2600   | \$35,000  |
| IntruShield Manager for Windows 2000   | \$8,000   |

as 200M bit/sec (see [www.nwfusion.com](http://www.nwfusion.com), DocFinder: 2028).

The fact that IntruVert is demonstrating through lab tests and in beta customer's production networks that its 2.2G bit/sec appliance can do the intrusion-detection system's job at up to 1.5G bit/sec puts the company — with 70 employees and \$15 million in venture-capital backing — in the running with other intrusion-detection system makers in the high-speed race. These

vendors include Internet Security Systems (ISS), TippingPoint Technologies, Intrusion, iPolicy Networks and Recourse Technologies, just acquired by Symantec.

"IntruVert has an ASIC-driven platform that lets it get this high performance," says Larry Holt, senior security architect at Computer Sciences Corp. (CSC), which manages network security for the National Library of Medicine, which is part of the National Institutes of Health in Bethesda, Md.

This 2,400-employee federal government facility, which shares journals and advanced research with other institutions, uses two 155M bit/sec OC-3 links to the Internet and a separate 622M bit/sec OC-12 link for research.

After testing the IntruVert intrusion-detection appliances in the CSC lab earlier this year, Holt installed them outside the firewall at the National Library of Medicine and inside it to monitor traffic, which can come in high burst rates, such as when the library sends information updates to Stanford University or NASA, for example.

"When you go to gigabit speeds, there's still the limit of actually getting the packets

onto the wire, but the IntruVert [intrusion-detection system] is detecting at near-gigabit speed with 100% accuracy," Holt says. He says the National Security Agency has successfully tested the IntruVert appliances at well over gigabit speeds.

IntruVert CEO Parveen Jain says eight beta customers have been testing the product for four months. He vouches for its 1.5G bit/sec rate without packet loss or degradation in intrusion-detection system attack recognition.

"A lot of customers are saying they need gigabit performance," Holt says. He swapped out the ISS RealSecure 6.0 intrusion-detection system sensors for the IntruVert sensors because the ISS sensors, even in load-balancing mode, were dropping packets at high speeds. Holt says he hasn't tried out the new ISS RealSecure 7.0 sensor yet.

IntruVert: [www.intruvert.com](http://www.intruvert.com)

## Netli

continued from page 29

difference — nearly tenfold improvements in Web site performance, he says.

But whereas Akamai aims to solve the problems of high-volume, mass-access Web sites, Netli has a different objective in targeting the performance of business applications. Fewer people use these applications, but the users generally play an important role in a company's business, Christy says.

"Netli has a content delivery scheme that has some of the attributes of something like an Akamai system, but is intended to focus on data that's way down in the popularity ranks," Christy says.

One challenge Netli will face is in building customer confidence. "People don't trust service providers now, especially new start-up ones, because of the sort of collapse of the whole service business. So even if it's a good idea, it might be an uphill battle," Christy says.

Stanford University Ph.D.s Michael Kharitonov and Adam Grove, along with Alexei Tumarkin, a former professor at the University of California, Santa Barbara, founded the company in 2000. This trio, along with a fourth party, filed a patent application in May that describes a method for network discovery using name servers. Netli secured \$17.9 million in funding this spring, according to the MoneyTree Survey compiled by PricewaterhouseCoopers, Venture Economics and National Venture Capital Association.

Before its second-quarter windfall, Netli said it had \$3.2 million in funding. Investors backing Netli include Morgenthaler Ventures, Bessemer Venture Partners, Leapfrog Ventures, Alta Partners and Nokia Venture Partners.

Netli: [www.netli.com](http://www.netli.com)

# Microsoft adds wireless notification services

■ BY JOHN FONTANA

Microsoft has announced an application platform that will let corporations use the SQL Server 2000 database as a foundation for creating notification services for wired and wireless users.

With SQL Server 2000 Notification Services, network executives can extend corporate, Web-based and portal applications with a mechanism that notifies users when updates have been made to information within those applications, such as price changes in a supply-chain application.

While notification services are available in many applications, Microsoft's service lets companies aggregate all notification services onto one platform so end users can subscribe to those notifications through a single interface. Competitor Oracle offers similar services and IBM has a publish-and-subscribe project called Gryphon. Several smaller vendors, such as Alerts, Apama and LetMeKnow, offer similar services.

"SQL notification services is very scalable, very clean to do," says Mike Felix, Hottrends product manager for Townsend Analytics, which develops financial software.

Last week, Felix rolled out SQL notification services for use with Townsend's Hottrends application, which tracks securities minute by minute and detects when

they are behaving in unusual ways, such as number of trades or rate of price change.

Felix takes the Hottrends feed and pumps it into SQL notification services, which matches the data with the users who have subscribed to it and pushes out notifications via e-mail and in the future, mobile devices. "We could have developed something similar ourselves but it would have been programming-intensive, and we didn't have the resources," Felix says. "And it would not have been as scalable or clean as what Microsoft has presented."

He says the project required an investment of a few thousand dollars, a few servers, one developer and less than one month of work. And Hottrends is only the start of Felix's use of notifications that will likely include newsletters and other financial products, along with use internally on applications such as project management.

"This is a very general-purpose platform in that you can feed almost any event into it and have users subscribe to it," says Peter Pawlak, lead analyst for server applications for Directions of Microsoft, an analyst firm. "This is different than hard-coded systems where administrators have to set things up. Here, subscribers control what they get."

The notification service is software with SQL as an engine that can process blocks of events and using batch processing match them to user subscription requests

for updates. But corporations must develop their own front-end interface and hooks to enterprise applications and delivery services, such as e-mail or wireless devices.

"Wireless is an enabler here, and when you combine this with something like presence services you can make sure users get their notifications on the device they are currently using," Pawlak says.

Critics say the addition of such enterprisewide services built on top of SQL Server is proof the database finally is stepping up from the ranks of departmental server.

"Companies are not as hesitant to use SQL on an enterprise level as they were a few years ago," says Mark Shainman, a research analyst at Meta Group.

SQL Server 2000 Notification Services is an add-on to SQL Server 2000, but will be a built-in feature in the next generation of the server code-named Yukon.

The software is available now and is a free download from Microsoft, but users must have a SQL Server license to deploy the platform and run notification applications.

Microsoft: [www.microsoft.com](http://www.microsoft.com)



## Wireless

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## A happy geek

research lab in the world) started licensing it in the early 1980s. Because I worked in a university and needed good support for TCP/IP networking, I mostly used the Unix distributions from the University of California at Berkeley, also known as Berkeley Standard Distribution (BSD). I never got into the almost-Unixes from Sun and Hewlett-Packard.

I've also been a Macintosh person since late 1983 but did not do a major switch to a Mac as my basic computing platform until I found MachTen by Tenon, which is a version of BSD Unix that runs as a Mac application. That let me run a single platform and still get my Unix fix. Then a year or so ago, Apple started shipping the first version of OSX, a full-fledged Unix system with a Mac-like shell over it. It was not quite as good at being Unix as MachTen was — and the Tenon user support was better than

Apple's — but the advantages of a unified system got me to switch.

Now Apple has released an upgrade to OSX and it's a great Unix and a great Mac. OSX was always solid — only one of my five Macs running OSX ever crashed and only twice at that — but OSX was a bit slow and had some funny quirks. OSX 10.2 has fixed all of that and is now fast, clean and a Unix geek's dream.

And for you other Unix geeks, note that Version 10.2 boasts the following: Every BSD and gnu command I ever use other than the gnu wdiff file comparison utility; 549 commands in /usr/bin, 35 in /bin, 60 in /sbin, 169 in /usr/sbin; a full development environment; open source; IPv6; Apache Web server; name server; sshd; sendmail; and procmail. And for you window-based personal computer (note I did not say "PC") folks, Version 10.2 features thousands of applications, including up-to-date

Microsoft Office and Internet Explorer. Good stuff.

The ads say that OSX 10.2 can be a good network citizen in a Windows shop, and I'll have to try some of that out when I figure out why I need to interact with a Windows network.

So I'm in hog heaven, even if I'm almost alone in Harvard's central administration in using a Mac — and even though OSX 10.2 did away with the smiling Mac on startup, much to the annoyance of Mac purists.

Disclaimer: My use of Macs is a perfect example of how Harvard's and my opinions are not necessarily the same, but the university tolerates me (most of the time).

*Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@sobco.com.*

### Telematics

continued from page 29

electronic systems in automobiles with satellite communications systems to provide features such as emergency calling, real-time navigation and remote car diagnoses.

### Big growth

According to research firm Frost & Sullivan, European revenue for telematics hardware and services topped \$1.11 billion in 2001, and the group estimates that market will grow to \$8.05 billion by 2007.

But the North American market hasn't fared so well. The revenue in 2001 for hardware and service telematics reached only \$900 million, but that number is expected to increase to \$6.99 billion by 2007.

Earlier this year, Ford Motor and Qualcomm ended their telematics development to cut their losses. Apparently, car buyers found the \$1,300 telematics add-on feature too much to swallow on consumer vehicles.

Since then, Ford has said it would consider embedding technology, such as the Bluetooth short-range wireless connectivity standard, into cars' computing systems to eliminate the need for consumers to pay for an add-on feature.

Some telematics capabilities are available now from other car manufacturers in consumer vehicles on a limited basis.

General Motor's OnStar subscription services are available in vehicles from Acura, Audi, Buick, Cadillac, Chevrolet, GMC and Saab, among others. Specific makes and models come equip-

ped with OnStar OnBoard, and car owners can activate the services via a handset in the vehicle. Drivers are offered a choice of three service plans, including features such as stolen-vehicle tracking, remote car diagnostics and emergency services.

### Gee whiz

While the gee-whiz factor of telematics appeals to many, industry experts say the best way to sell such technology is with safety guarantees. According to Strategy Analytics Analyst Ian Riches, the safety benefits of GM's OnStar roadside assistance and emergency calling features are obvious, but telematics providers must find the safety angle for in-car navigation and traffic information systems to hit home with consumers.

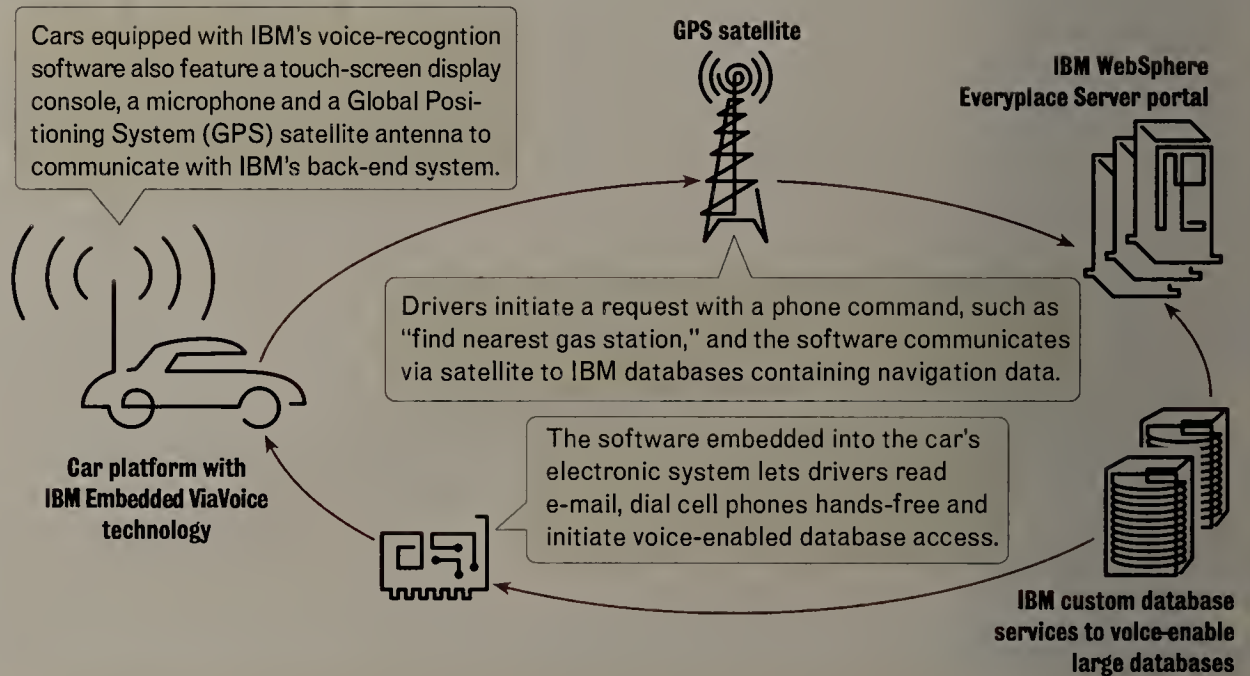
The market for telematics in commercial vehicles is more mature, considering companies can deploy fleet management software to track the location of shipping trucks or avoid traffic to ensure timely delivery.

"This clearly could be done: Attempting to use a paper map or driving erratically, making last-minute turns while trying to find one's way are clearly not the safest ways to making progress," Riches says in a report. In addition, because some telematics systems involve the use of cell phones and PDAs, safety concerns about drivers handling them is another issue.

"Widespread bans on the use of handheld mobile devices will not stop the [telematics] market in its tracks, but they do represent a worrying development in potentially restricting the options for

### Car talk

IBM's software gives Honda Accord a voice.



vendors," Riches says.

### IBM initiatives

IBM's deal with Honda is the company's latest telematics initiative, now available in consumer cars. And because the Accord's computing system can now respond to voice commands, IBM and Honda might avoid any safety concerns related to telematics. In the past, Accord drivers could access an in-vehicle navigation system by accessing data via the touch display. Now drivers can enjoy hands-free navigation.

The IBM Embedded ViaVoice technology is included in Honda's computing platform within the vehicle.

The car also includes an antenna and microphone to let the voice communications connect

to a back-end system via a Global Positioning System satellite. Honda supports an IBM WebSphere Everyplace Server/Portal for Telematics download on the back end. Drivers access this system via a console in the car or by speaking.

The software recognizes about 150 English-language commands, such as "find nearest gas station" or "find nearest ATM." It also acknowledges several accents.

To activate the Touch by Voice system, drivers press a talk button on the Accord steering wheel and make a verbal request. IBM's technology is integrated into the car's audio system so the driver hears the computerized response over the car speakers.

The software will give directions to and from the specified address. The Touch by Voice voice-recognition

system is designed to minimize the need for keyboard entry. The system also links to climate control systems for added driver convenience.

IBM's automotive health monitoring and remote diagnostics prototype is being showcased in the Chrysler Concorde.

IBM made news with telematics last year when the company signed on with Motorola to offer wireless and Web-based telematics services to drivers and passengers worldwide.

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# Special Focus

**APPLICATIONS:** A look at what's new in call center software implementation.

## Revamped call centers reduce operating costs

■ BY ANN BEDNARZ

**C**ustomer service upgrades today are as much about revamping workflow and business processes as they are about new technology.

Many companies have core call center technologies, such as call routing, e-mail management, and online chat and customer self-service software. But the gaps in between need addressing, experts say.

AMR Research found 72% of companies still route sessions through individual applications rather than through a universal queue, and 63% of companies with multiple contact center locations don't share interactions between sites.

Gartner says technologies that put client knowledge into the hands of contact center agents are critical to improving call center efficiencies and cost savings. This includes staff management, call tracking and workflow software. It's not an issue of availability: The market is ripe with hundreds of products. Suite vendors such as Siebel Systems, Amdocs and PeopleSoft offer broad sets of customer service and support software. Companies such as Aspect Communications, Blue Pumpkin Software and Genesys tackle narrower areas of expertise, such as Web collaboration and workforce management.

But so far adoption is limited. Gartner found just 15% of companies surveyed have rolled out automated workflow software; 41% have adopted software for incident tracking; and 37% have tackled computer-telephony integration.

Part of the problem is that no one customer service and support (CSS) vendor offers it all, forcing corporate customers to buy from multiple sources and work to integrate the pieces, Gartner says.

But the payoff of such integration is greater efficiency in handling customer queries, which can translate into real savings. If a company can increase the number of queries that are resolved in a single phone call from an average of 82% to 91%, it will reduce overall call center volume by 9%, Gartner says. In a 50-agent call center handling 70,000 calls per month, that can amount to 4.5 full-time employees. If each full-time agent earns \$29,000, that's about \$131,000 saved annually, Gartner says.

Timberline Software realized significant savings by revamping its call center operations. The vendor was considering hiring 30 customer service agents to keep up with projected call volume growth — a staff increase it managed to avoid by better managing its existing talent.

Timberline invested in workforce optimization software from Blue Pumpkin that handles agent scheduling and skills-based call routing. At the same time, Timberline, of Beaverton, Ore., revamped the way its call center operates, shifting from call-back mode — a system that requires customers to call in, leave a message and wait for a return call — to live inbound call handling.

"Going to live inbound calls required us to redesign a bunch of different processes," says Mark Brannan, opera-

tions director for client services at Timberline, which makes accounting and cost-estimating software for construction and real estate firms.

The scheduling component replaces a manual system based on Microsoft Excel spreadsheets. Coupled with historical information about call volumes and types of queries received, the scheduling software helps Timberline better allocate its resources and minimize underutilization of people.

Another process that Timberline changed is training. As part of its Blue Pumpkin rollout,

clients in a personalized, private manner," Gallen says.

Agents use Divine's NetAgent suite to view customer information, engage in online chat and respond to e-mail. Divine's Expressions software powers five online forums and one chat room. NetAgent's thin client makes it easy to deploy remote agents, Gallen says. Some of her staff work onsite at the call center, others work from home.

NetAgent and Expressions are the only third-party software NutriSystem uses, Gallen says. Everything else is custom built in-house. The software is tied to NutriSystem's proprietary systems so remote counselors can gain access to back-end databases and customer information.

Agents can be more productive with online chat, because they can have more than one session going at once, Gallen says. But it also poses difficulties in that online chat relationships are different from phone conversations. "Tone of voice is tough to read, so we have to be careful," she says.

NetAgent scripting features help.

Plus NutriSystem agents have learned to control chat conversations by typing short, three- or four-word messages to avoid the problem of everybody writing at one time and nobody waiting for answers, Gallen says.

Driving Affina's call center overhaul is the need for better systems integration. The Peoria, Ill., company provides contact center outsourcing for customers including Panasonic,

Kellogg's, Acura and Energizer.

The company took a best-of-breed approach to software in the past, says Victor Burgess, vice president and general manager of alliances. Affina selected applications based on functionality and deployed them on independent servers.

As a result, Affina wound up with more than 15 different applications running on five different CRM platforms — four commercial systems and one homegrown system — plus the associated IT costs for maintaining each. The problem was that information didn't move smoothly between applications, says Steve Gonzalez, executive vice president of sales and marketing.

Last spring, Affina decided to migrate its disparate CRM systems to one platform to provide customers with better data in a more timely way and ease its own IT burden. Affina chose Oracle's E-Business Suite and is in the process of moving its customers to the new system.

The biggest change will be the opportunity to provide better real-time analytics, Burgess says. "It's not just about answering the telephone. It's also providing some analysis of what we're seeing with call flow, what we're learning about the client, and what we're learning about opportunities for generating revenue," he says.

Gonzalez says customers are looking for more automated voice and speech technology, and Web technology to provide self-service options. Oracle's suite will help Affina provide a more integrated Web interface to clients, he says. ■

### Call center progress

**No one suite does it all. Today's customer service centers run multiple applications for voice, e-mail and Web contacts that need to work in tandem if operations are to run smoothly and cost effectively.**

#### Challenges

- Integrating data from disparate applications and getting it to customer service agents in real time.
- Providing consistent service whether a customer makes contact through e-mail, Web or voice channels.
- Trimming costs without sacrificing service.

#### Strategies

- Consider application integration middleware to link call center programs in real time.
- Prioritize investments by focusing on most-used contact methods. If customers prefer phone, consider an interactive voice response system over an e-mail management system.
- Look into niche applications to solve specific problems, such as call tracking software to improve call resolution rates, or workforce automation software to reduce staffing inefficiencies.

### Customer dissatisfaction

More than  
**75%**  
of businesses will fail to meet expectations for customer service excellence through 2007, Gartner says.



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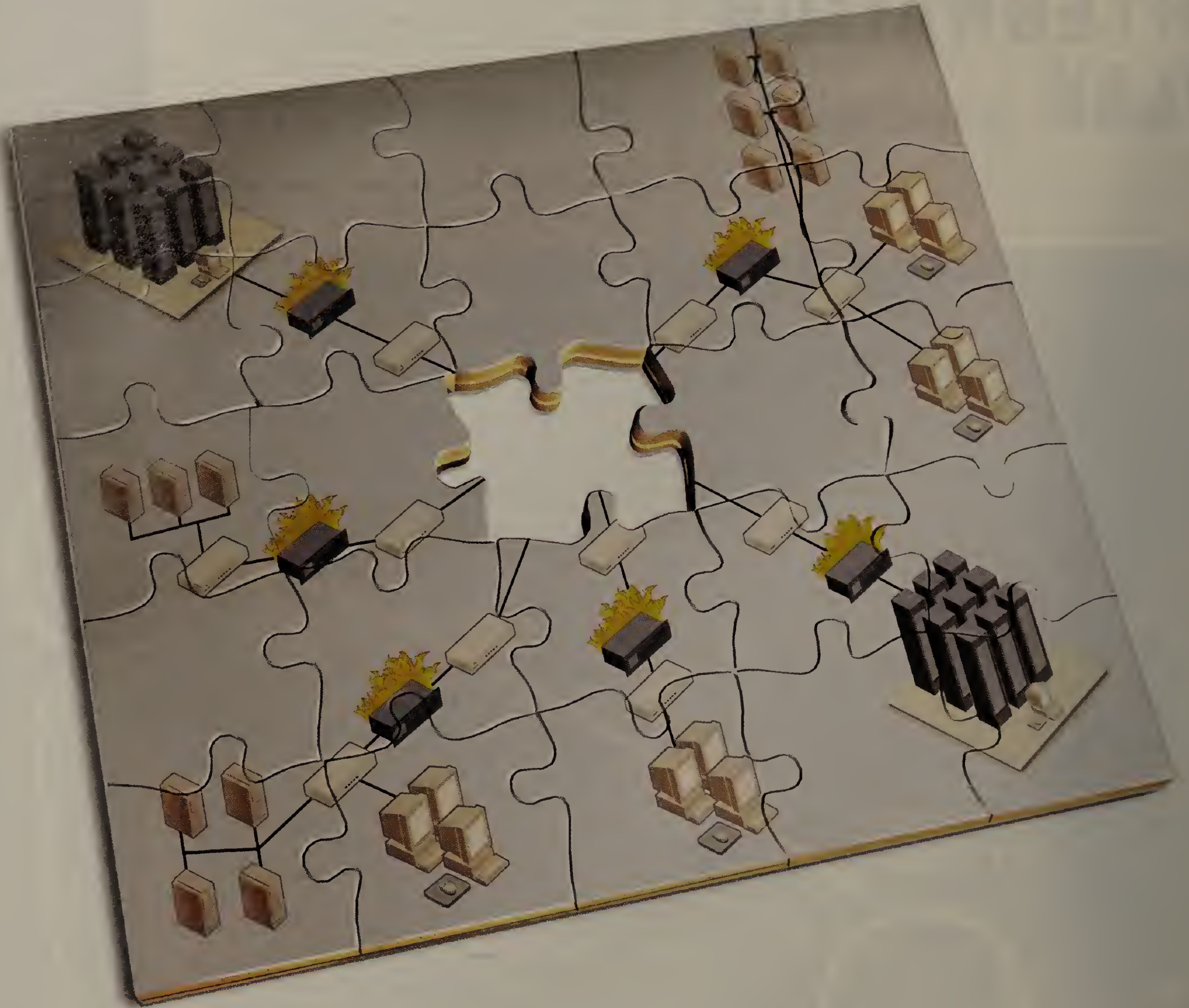
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# Service Providers

■ THE INTERNET ■ EXTRANETS ■ INTEREXCHANGE AND LOCAL CARRIERS  
■ WIRELESS ■ REGULATORY AFFAIRS

## AT&T to host key federal Web portal

■ BY CAROLYN DUFFY MARSAN

AT&T hopes to raise its profile in the Web hosting market following its recent win of a high-visibility contract to support the federal government's Web portal, FirstGov.gov, which is one of the most vis-

ited sites on the Internet.

Receiving more than 50 million hits last year, FirstGov.gov is the central location for U.S. citizens to access online information about a variety of government services, including passports, taxes, student loans, benefits, auctions and national parks. The popular site catalogs more than 51 million federal, state and local government Web pages.

AT&T will host the FirstGov site on two of its 18 Internet data centers worldwide. AT&T also will design and deploy a suite of managed security services, including firewalls, intrusion detection, risk assessment and business-continuity planning.

The federal government's General Services Administration last month awarded AT&T a four-year, \$7.6 million contract to host FirstGov.gov. AT&T's partners on the

contract include Sun, Oracle and Mercury Interactive.

"It's a great deal for AT&T," says Carrie Lewis, an analyst at The Yankee Group. "They are becoming a stronger player in Web hosting. They're one of the most stable players in the Web hosting marketplace, and this contract is indicative of that fact."

Lewis says AT&T should be able to leverage the FirstGov.gov win in the government sector, which has a growing need for Web hosting, and in the highly competitive commercial sector.

"They are going to have to build some sort of ironclad security platform for the federal government," Lewis says. "If they can build this platform and deliver it, then they can repackage it and offer it to other industries."

That's exactly AT&T's plan, according to company officials.

"AT&T is not top-of-mind for Web hosting," says Don Teague, vice president of civilian sales for AT&T Government Solutions. "For most government agencies and most commercial [accounts], if they made a list of the top five firms in hosting ... we wouldn't show up very often. That's too bad because we have a phenomenal capability borne of our huge network."

AT&T plans to use the FirstGov contract to help deliver the message that Web hosting is a core capability for company.

"Why are we so heavily invested in this and why are we getting so good at this? Because so many of our customers are going to hosting," Teague adds.

"We will provide a very secure network environment as well as the physical environment," he says. "You almost can't talk about hosting without talking about security, so we've put together an integrated approach.... With FirstGov, you'd be fooling yourself to provide this kind of connectivity without security."

AT&T was the incumbent contractor on the hosting bid because its subsidiary, GRC International, designed the original FirstGov site in the fall of 2000. Last March, AT&T won a separate five-year, \$10 million

See AT&T, page 38

### Short Takes

■ Global IP service provider **Equant** recently signed a deal with content delivery network system maker **ActiVia Networks**, moving Equant a step closer to launching its global managed CDN. Equant plans to launch the service late this year or early next year. ActiVia's equipment will let Equant route users on the network to the server nearest them and push updated content to servers on the network. This will let subscribers to the service use their bandwidth more efficiently.

■ **WorldCom** last week enhanced its **Global Managed VPN service** with a series of new offerings. The enhancements include a new platform for WorldCom's IP VPN dedicated service; an IP VPN remote access-to-frame offering that lets telecommuters access frame networks through WorldCom's IP backbone; and DSL and Ethernet VPN access. DSL speeds up to 1M bit/sec are available and Ethernet offerings let users establish connections of up to 40M bit/sec.

■ **Demand for wavelength services** will show steady growth over the next several years, driving the market to \$1.6 billion in revenue by 2006, according to a recent study by Gartner. Revenue for wavelength services should be \$705 million this year, up 22% from 2001, the study says. The biggest growth sector for wavelengths will be the metropolitan market, which the study predicts will account for 32% of the overall wavelength market by 2006, up from 20% in 2002.

## RBOC struggles seen putting a drag on services

■ BY MICHAEL MARTIN

BellSouth's recent earnings-projection cut is only the latest in a litany of financial woes for the four regional Bell operating companies that could be putting a crimp on service rollouts and customer service.

Unlike many of the interexchange carriers and competitive local exchange carriers (CLEC), none of the RBOCs — BellSouth, Qwest, SBC Communications and Verizon — has filed for bankruptcy. But they obviously are not reaping the benefits of competing against fewer players.

"You'll see their [service] rollout plans delayed somewhat," says Sandra Palumbo, an analyst with The Yankee Group.

New services such as IP VPNs and metropolitan Ethernet offerings will almost certainly be rolled out later than they would have been if the RBOCs were still performing well financially, Palumbo says.

"They're going to make sure the demand is there first, before they offer anything," she says.

Courtney Munroe, an analyst with IDC, says the RBOCs' financial woes shouldn't have any immediate effect. However, the ongoing difficulties do indicate that the RBOCs aren't likely to begin any sort of recovery before year-end, he says.

In its revenue warning, BellSouth reduced its earnings-per-share projection from \$2.13 to \$2.06. The move followed a previous projection cut in July, when BellSouth announced its second-quarter earnings slid from \$800 million in the year-ago quarter to \$293 million.

The other three RBOCs also have had a rocky year.

### Bells getting rung

**None of the Baby Bells has had to file for bankruptcy like some of their competitors, but their financial news hasn't been pretty.**

**BellSouth:** Cut its 2002 earnings projection in August.

**SBC:** Second-quarter earnings fell more than 10% from the year-ago quarter.

**Verizon:** Cut back its 2002 earnings projection in July.

**Qwest:** Uncovered accounting errors in July that have delayed its second-quarter report and will lead to \$1.6 billion in restated earnings.

In July, Qwest uncovered more than \$1 billion in improper accounting that has caused the RBOC to go over its books from 1999 to 2001 and delay its second-quarter report.

Verizon met financial analyst expectations with its second-quarter results, but lowered its 2002 earnings projection.

SBC beat Wall Street's earnings target in the second quarter, but the company's second-quarter earnings of \$1.8 billion were down more than 10% from a year ago.

The poor results, combined with last year's showing, have resulted in job cuts.

After eliminating 29,000 positions in 2001, Verizon announced another 10,000 cuts in March. In May, SBC announced

See RBOC, page 38



### More online!

See how other government projects will shape the face of networking.

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## EYE ON THE CARRIERS

Johna Till Johnson



If you're like most network executives, it's been a long time since you've gotten a thrill from your work. Between the gloomy stock market, reductions in workforce, and the financial (and ethical) woes of your service providers, it's hard to remember the excitement and wonder you once felt about the power of networks. As one network executive told me recently, "It just seems like all the fun's gone out of networking technology."

We've all gotten more jaded, I'll admit (or maybe just older). But although the spark may have flickered, it hasn't gone out. While you've kept the circuits up, systems stable

## Rekindling the thrill of networking

and applications flowing smoothly, others have been thinking, talking, and writing about the 'Net and its effect on the world.

Here is an annotated list of the best network technology-related creative work that I've found, passed along in the hope it will remind everyone why we got into the field in the first place. (Disclaimer: Neither my company nor I have any affiliation with the creators of these works, and the opinions reflected are solely my own.)

**Books.** You should definitely check out *Linked: The New Science of Networks* by Albert-Laszlo Barabasi. I guarantee you that the time spent reading it will be among the most entertaining, mind-expanding, and thought-provoking hours you'll spend this fall. Despite the title, there's nothing deeply technical about the topic, although the author is a practicing scientist and formulas are provided for the mathematically minded. The author takes some fundamental concepts and applies them to a stagger-

ing array of real-world scenarios, including gossip at cocktail parties, viral epidemics and the Internet's putative resilience.

Science-fiction buffs also should be sure to catch *Cryptonomicon* by Neal Stephenson. It's a wonderfully twisted tale that links World War II encryption with the decline and fall of a late 20th century dot-com — rather prescient for a book that came out in 1999. I've been a Stephenson fan since *Zodiac* (another great read that predates his pioneering novel, *Snow Crash*). If you like hard science fiction, you will like his work, too.

**Comics.** You can't possibly miss "Helen, Sweetheart of the Internet," stalwart defender of geekdom everywhere and one of the few comic heroes who understands the difference between Ethernet and ATM. Who else would trade two Bob Metcalfe cards for a Vint Cerf (see the Aug. 12, 2001, issue)? If she's escaped your notice before, take a look at [www.ucomics.com/helen](http://www.ucomics.com/helen).

**Essays.** Every now and then someone crafts a thought-provoking, well-reasoned piece about the affect of the 'Net on business. Singer-songwriter Janis Ian recently put together a pair of essays about the business, and the philosophical and social implications of online music downloads. Unlike most opinion pieces on the topic, these are well-researched, heavily documented, and logically coherent — and applicable to many other forms of online intellectual property (such as software). These are "must reads." You might not agree with her conclusions, but these essays will make you think. See [www.janisian.com/article-internet\\_debacle.html](http://www.janisian.com/article-internet_debacle.html) and [www.janisian.com/article-fallout.html](http://www.janisian.com/article-fallout.html).

*Johnson is senior vice president and CTO for Greenwich Technology Partners, a network consulting and engineering firm. She can be reached at [johna@greenwichtech.com](mailto:johna@greenwichtech.com).*

## AT&amp;T

continued from page 37

contract to upgrade the search capabilities of the FirstGov site. AT&T will be earning about \$3.9 million per year to support the FirstGov site over the next four years.

Having captured the FirstGov contracts, AT&T is positioning itself to pursue other e-government initiatives. The Bush administration has identified 24 high-priority e-government initiatives, including a digital signature project called E-Authentication and a portal for grant recipients and grant-making agencies called E-Grants. AT&T officials say they plan to pursue many of these opportunities.

"The key thing [with FirstGov] is its importance in the president's e-government initiatives and how this site is being leveraged into the ongoing 24 initiatives," says Chris Stelter, a director of sales engineering for AT&T Government Solutions, who runs the FirstGov program. FirstGov is "one of the linchpins."

"Over time, FirstGov will become the place for a lot of e-government transac-

### Poised for growth

Estimated growth for the federal government's Web hosting expenditures:



#### Statistics include:

- Web hosting and collocation.
- Managed Web hosting.
- Application support.
- Remote storage.
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tions," says Cynthia Shockley, vice president of consulting at Federal Sources, a Vienna, Va., market research firm. "Applications like E-Grants will need to be secure, so I can certainly see the need for upgrading the security... This [contract] is a coup for AT&T." ■

## Open source group releases telephony services platform

■ BY STEPHEN LAWSON

The GNU free software project has released the first complete version of its platform for telephony services applications, the group announced last week.

On the new software platform, called GNU Bayonne Version 1.0, developers can write open source applications for phone system functions such as call direction, voice prompts, voice mail and automated order processing. Although it was developed with companies in mind, carriers also can use it as the basis for applications such as customer voice mail and prepaid cell phone services, according to David Sugar, head of the GNU Bayonne project. He also is the CTO of Open Source Telecom, which has provided commercial sponsorship of GNU Bayonne development.

"Any type of voice application that re-

quires application programming logic can be [created with] Bayonne today," Sugar says.

The GNU Project is a volunteer effort by developers around the world, sponsored by the Free Software Foundation (FSF), to create a full operating system that can be freely distributed. GNU makes its software available under the GNU General Public License, which lets developers view and modify the source code of the software as long as they make their modifications freely available to other users. GNU Bayonne is part of GNU Enterprise, a subset of the GNU operating system, which is based on the Linux kernel.

Free software not only saves companies and service providers money but also lets them adapt a piece of software to their needs, a big benefit in telecom, Sugar says.

Support for telecom platforms based on free software and standard, interchangeable hardware components is coming from several companies. Earlier this year, vendors including Intel, Cisco, IBM and Hewlett-Packard announced a working group to develop and promote a version of Linux that meets service providers' reliability standards. In addition, a new version of the Compact PCI hardware interface may make it possible for users to mix and match telecom switch and server components.

The developers of GNU Bayonne paid attention to the emerging carrier-class Linux code as they developed the telephony software and intend to make it compatible with carrier-class Linux, Sugar says.

GNU Bayonne can be downloaded from [ftp://ftp.gnu.org/gnu/bayonne/](http://ftp.gnu.org/gnu/bayonne/).

*Lawson is a correspondent for the IDG News Service's San Francisco bureau.*

## RBOC

continued from page 37

5,000 job cuts and BellSouth revealed it would be cutting between 4,000 and 5,000 positions.

After announcing 7,000 cuts in December, Qwest has not made any more large cutbacks. But the company has trimmed small numbers of workers regionally throughout the year.

There's no obvious way to tell if the cutbacks at the RBOCs are affecting customer service. But, Palumbo says job cuts often affect service levels. She says enterprise customers were disenchanted with the service they were getting from the RBOCs even before the latest cuts.

In a survey of 171 large business cus-

tomers at the start of the year, Qwest led the RBOCs, with 58% of businesses surveyed saying they were satisfied or very satisfied with Qwest's customer service.

"That's not a very good figure, given that the enterprise market segment is a key customer base for the RBOCs," Palumbo says.

There are several reasons for the RBOCs' struggles.

The poor economy is definitely having an effect. Although the RBOCs competed with many of the CLECs that have disappeared, they also sold services to them.

Another major factor is a regulatory environment that hurts the RBOCs, says Thomas Nolle, president of consulting firm CIMI Corp. and a *Network World* columnist.

"There's no question that regulators have done a tremendous disservice to the

industry," he says.

The Telecommunications Act of 1996 asked the RBOCs to do too much, Nolle says. Not only did it ask them to move from a regulated market to an open market, it forced the RBOCs to invest in new infrastructure that had to be shared with competitors at below-market rates.

"It makes no sense that they have to modernize their networks but competitors can piggyback on them at no risk," he says.

Michael Powell, chairman of the Federal Communications Commission, has talked about easing some of the regulatory restrictions on the RBOCs but hasn't done anything significant up to this point, Nolle says. Any regulatory changes made now would be too late to help the RBOCs plan for next year, he adds. ■





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# The Edge

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## Q & A

### HP readies for assault on service providers

*Now that Hewlett-Packard's merger with Compaq is a done deal, the company is moving forward rapidly to build on its already considerable business with service providers. The mantra for HP's network and service provider division is: standards and Linux. The company hopes to profit from the trend to drive proprietary hardware and software out of carrier networks and to convince service providers that hardened Linux platforms are just what they need for their next-generation networks. Recently Network World Senior Editor Tim Greene had a conversation with Sebastiano Tevarotto, HP's vice president and general manager of the company's Network and Service Provider business unit.*

#### What is your vision for the service provider unit and its business partners?

It is for an open standards network that will enable services to be quickly deployed, and hence provisioned to customers, and managed at marginal operating cost. Those services will be developed by a variety of entities, not just by the service providers or HP. Openness becomes of incredible value because service providers will not be able, as they were in the past with voice services, to control everything. They need to create this open entrance where any clever company that has a service that delivers value to customers can transition in, pay a price and serve some customers.

#### How big is HP with service providers?

Some of our OpenCall signaling middleware has more than 3,600 installations around the world. People don't know that we are there. A significant number of prepaid wireless customers are served over the prepaid OpenCall solution. We are kind of uniquely positioned because of the IT and telco knowledge to solve today's and tomorrow's needs of the service providers. We have more than 1,000 engineers who work on developing these technologies, in [research and development]. And we have a critical mass of services people who can join forces with partners to take solutions directly to the customers.

#### What important products have resulted from the merger?

With OpenView, we were going into the area of network management. By bringing together [Compaq's Telecommunications Management Information Platform] and OpenView, we are years ahead of any competitor in bringing a service offering that allows us to manage IT and telecom networks together. Also, the new Opencall service-delivery platform is an area where both companies were going.

With the service delivery platform, you create a level of abstraction that separates the complexity of the network from the customer-facing part of the activity. Hence, you can introduce the service, and then the service-delivery platform takes the responsibility to interface with all of the network elements. The result is a significant cost reduction because you don't develop things several times, and more importantly, a dramatic reduction in time-to-market for the services because that platform is standards-based. Once the services you have comply with the standards, you are guaranteed that those will run on top of your platform.

#### Who do you regard now as your competitors?

There is not a competitor now. We are pushing open standards, so the competitor in that area is Sun Solaris and the proprietary nature of Sun Solaris. The industry is moving into Linux, so we are definitely carrying the flag of developing carrier-grade Linux systems and using Linux extensively. Both companies were investing in Linux. We've merged the two efforts and accelerated things. In the carrier grade, HP was slightly ahead. ■

## Short Takes

■ **CommWorks**, the carrier equipment arm of 3Com, announced last week that its voice-over-IP gear for service providers has surpassed 10 billion minutes of VoIP traffic over carrier networks. CommWorks' VoIP product lineup includes the **Total Control 1000 Media Gateway**, the **4007 SS7 Signaling Gateway** and the **7220 Accounting Server**. VoIP systems based on these products are installed in carrier networks such as WorldCom's and China Unicom's. Giga Information Group estimates that less than 1% of the 200 billion minutes of world telephone traffic will be carried by IP this year.

## Report: Telecom market still slow

■ BY PHIL HOCHMUTH

It was a tale of two markets for optical transport and multiservice SONET gear in the second quarter, Dell'Oro Group reports.

The revenue from long-haul optical gear shrank greatly, the analyst firm says, while demand grew slightly for multiservice SONET boxes that deliver bandwidth management beyond the capabilities of traditional add-drop multiplexers. Revenue for the optical transport market declined 19% from the first quarter, totaling \$1.9 billion in the second quarter, according to Dell'Oro, while revenue from the sale of SONET/SDH multiservice systems totaled \$336 million, a 2% jump from the first quarter.

Nortel led the market for optical transport gear, despite a 4% drop in revenue from the previous quarter in that market. Alcatel, with revenue growth of 6%, came in second, while Lucent — which saw its sales of

optical gear drop by more than a quarter from the first quarter — ranked third.

For the optical transport market, the second quarter was the continuation of a long, sad story. The market for long-haul telecom gear has declined every quarter from a peak of \$6.2 billion in the fourth quarter of 2000. This 69% decline over the last six quarters reflects the broad weakness in demand for telecom gear from carriers, which have cut capital expenditures after overextending their capacity over the last few years, according to Dell'Oro. Slowing customer demand and poor financial results also have contributed to weak telecom spending by carriers, the analyst firm says.

Growth in the SONET/SDH multiservice switch segment was a small bright spot for carrier gear makers. These boxes are basically high-density add-drop multiplexers with the ability to manage bandwidth among multiple SONET rings.

Dell'Oro says demand for datacom services from corporations is driving demand for SONET/SDH multiservice gear, which can provision services more efficiently than previous-generation add-drop multiplexers.

Three vendors each took about a quarter of the revenue for this equipment, as Alcatel led with 28%, followed by Nortel at 25% and Cisco, which garnered 22% of sales. ECI Telecom's Lightscape Networks division scooped up the largest share of what was left, with 8%.

While the fortunes of carriers and carrier equipment makers are sagging, people and businesses are not using the Internet any less, just less than previously expected, analysts and observers say. For instance, the London Internet Exchange, Europe's largest 'Net hub, says its average backbone utilization — around 12G bit/sec — has grown three times since last spring. ■



# Marconi looks to future

Refinanced debt and product focus may help turnaround.

■ BY TIM GREENE

LONDON — When you think of Marconi, you now should think only of switch routers and optical gear.

In an effort to regain profitability, the company had revamped itself to focus on only these products and to get rid of side interests unrelated to these areas. It has convinced its creditors that this is the route to success.

Starting in January, the company will wipe clean much of its \$6 billion in debt, start shopping around some of its divisions and proceed under watchful eyes of the banks that lent it money and that will own 99.5% of its stock. Unlike many other network companies, it has accomplished this without filing for bankruptcy.

With the reorganization comes a new name — Marconi Corp., replacing Marconi LLP — and a more modest set of financial goals. Whereas the company took in \$7 billion in its last full fiscal year, under the new plan its goal will be only \$4 billion. It also hopes to profit by \$199 million, which is a stark contrast to the \$8.6 billion loss it suffered in its last fiscal year.

That new business plan calls for reducing research and development from 12% to 10% of sales, a cut that is compounded because sales projections also have dropped. R&D money will drop from \$840 million to \$400 million, based on figures the company has released.

This new financial outlook stems from lessons learned after Marconi got caught up in the exuberance and optimism of network boom times and borrowed too much.

"We overextended ourselves," says Joe Pajer, Marconi's executive vice president of broadband routing and switching. "We simply borrowed too much money and spent too much money."

Marconi set its plan to trim down the company last spring and has worked since to convince the banks that lent it money that it could turn itself around. The creditors decided to give the company a chance, rather than sell its assets.

"They could have liquidated us and gotten a certain amount on

## Marconi by the numbers

Over the past year, Marconi has revamped its business structure and realigned its finances in an attempt to survive long term.

**Fiscal 2002 revenues and losses**  
(in billions)



**Employees**  
(in thousands)



**Research and development**  
(% of revenues)



the dollar, or looked at our plan and decided whether that is going to produce a better outcome than taking us to liquidation," Pajer says.

Marconi's flagship products in North America will continue to be its multiservice switch, the BXR 4800, which combines the properties of switches and routers as a hedge against the types of networks service providers build. This switch is supplemented by other gear that largely came from Marconi's purchase of FORE Systems for \$4.5 billion in 1999.

If providers choose ATM networks, for instance, the BXR 4800 can switch ATM. If providers choose IP, it can route IP. It can do both at the same time and bridge the two. So it can take in ATM, for example, but switch the traffic and put it out as IP or Multi-protocol Label Switched packets.

Outside North America, where Marconi claims to have top penetration into carrier optical networks, the company will focus more on its optical gear that ranges from add-drop multiplex-

ers to optical cross-connects.

When the new company name takes effect in January, Marconi will look to sell some of its other ventures including its medical systems, commerce systems and data systems divisions. It also will sell some real estate and its interest in an Italian lottery company.

This financial restructuring should help the company sell its gear.

"With the company internally suffering from reorganization and flagging financial results, it will be hard to market [its] advantage to carriers," Current Analysis senior analyst Fintan O'Halloran wrote in June.

But with a new plan for profitability, the company can better convince potential customers that it will be around for the long term.

"This financial question has been a black cloud," Pajer says.

With a better balance sheet, the company may be able to make inroads against established competitors Alcatel, Lucent, Nortel and Siemens, which have had financial troubles of their own. ■

# Polaris Networks wheels out its first product

■ BY TIM GREENE

SAN JOSE — Polaris Networks this week will introduce its next-generation digital cross-connect system and software that it says will reduce the provisioning time for popular T-1 circuits.

Called the Optical Metro Switch (OMX), the Polaris box will support automated provisioning via its IntelliOp management software. Polaris says its gear will reduce the time it takes to provision these circuits from weeks or months to days by eliminating manual steps.

The software includes a network planner that lets engineers model changes to the network and analyze how they will affect performance before implementing them. If a business customer needs to add a major connection, the service provider can discover the impact and make appropriate alterations before trying to turn up the circuit.

IntelliOp also supports software upgrades without turning off the machines, so carriers can install software revisions without interrupting customer service.

OMX is smaller than traditional gear and has a switching fabric that will support ATM, IP Gigabit Ethernet, SONET and TDM. When it ships later this year, it will support only TDM and Synchronous Transfer Mode transport, but also will support other protocols by the end of 2003, Polaris says.

The device can act as a bridge between older and newer equipment in carrier nets by virtue of supporting multiple protocols.

Traditional cross-connects do not have the ability to switch these other traffic types. Instead they rely on gear around them to do so. By performing the functions of these other pieces of equipment, such as SONET add-drop multiplexers and ATM concentrators, the OMX can reduce the amount of gear in provider networks. This approach decreases the capital outlay to build a network, and fewer devices to manage means lower operating costs, the company says.

The device can groom circuits as small as a T-1 and place them

on the appropriate trunks. T-1s are among the most popular circuit sizes bought by businesses. Continued demand for these circuits drives the need for cross-connects in carrier networks. The device supports OC-192 SONET trunks, but later the company will introduce DS-3 and OC-3 trunks.

The new device will compete in some aspects against other new gear from Ciena and former Cerent gear that was bought by Cisco in 1999. It also competes against cross-connects, the Titan 5500 from Tellabs and the Alcatel 1631. Whereas these devices take up 27 racks to support 1,024 ports of STS-1, an OMX supports that same number in a half rack. One OMX chassis has a switching capacity of 240G bit/sec, and connecting chassis together into one logical switch can boost that to 2 terabit/sec.

Multiple OMX chassis are connected via dedicated interconnection ports that don't eat up trunk ports. When linking multiple chassis, the switch cards are installed in dedicated chassis, known as switch-matrix chassis, and the trunk cards are placed in chassis known as switch-interface chassis.

OMXs can be placed in ring configurations on existing optical ring networks and function as a SONET add-drop multiplexer or in meshed configurations.

The company is working to get Operations Systems Modifications for the Integration of Network Elements certification for the switch, which will mean it is interoperable with the operations support systems used by major U.S. local carriers. Polaris also is trying to get New Equipment Building System 3 certification for the OMX that shows it meets the physical standards required by most carriers.

Polaris was founded in June 2000 by Ray Kao, who earlier founded TransMedia (bought by Cisco).

The company has \$77 million in backing from Redpoint, Venrock & Associates, Advanced Technology Ventures and StoRM.

Polaris: [www.polarisnetworks.com](http://www.polarisnetworks.com)





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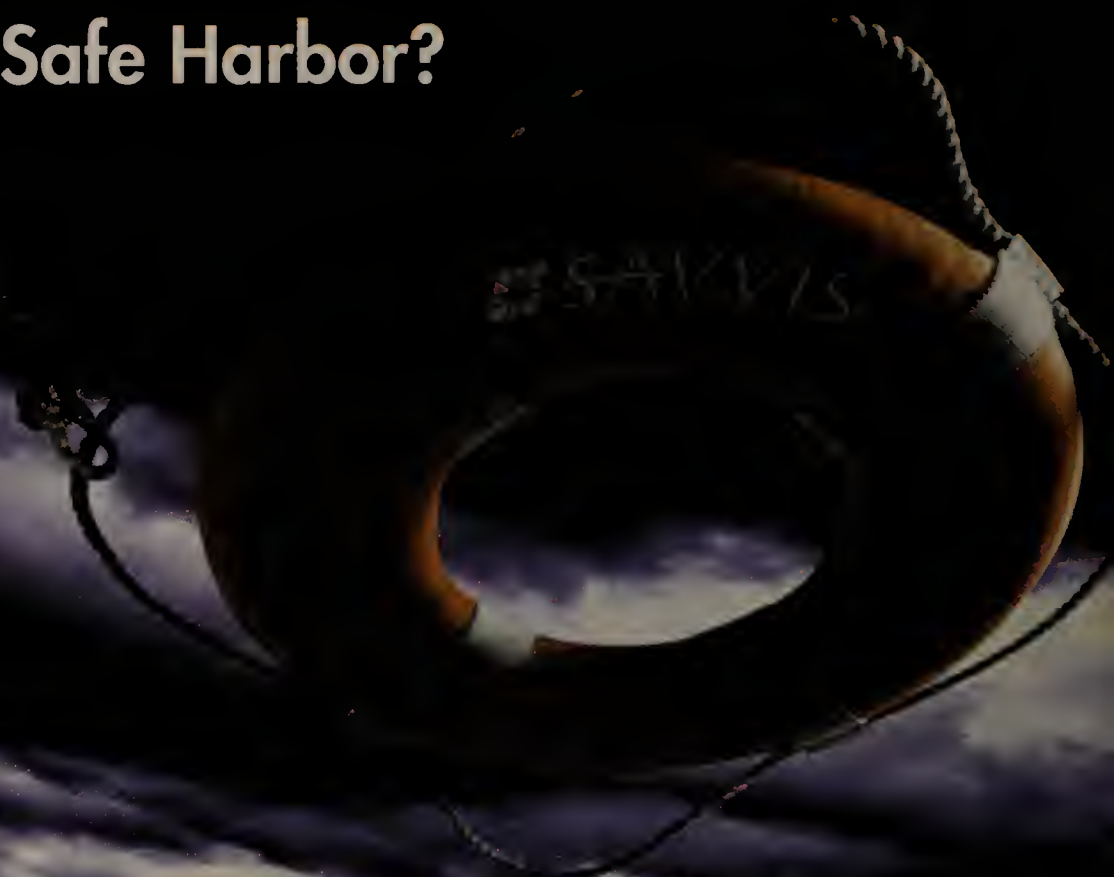
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# Technology Update

■ AN INSIDE LOOK AT THE TECHNOLOGIES AND STANDARDS SHAPING YOUR NETWORK

## iSCSI delivers storage over Ethernet

■ BY BRYCE MACKIN

iSCSI is a block-level storage protocol that lets users create a separate storage network using Ethernet. iSCSI uses Ethernet as a transport for data from servers to storage devices or storage-area networks. Because iSCSI uses Ethernet, it doesn't suffer from some of the complexity and distance limitations that encumber other storage protocols.

The iSCSI protocol puts standard SCSI commands into TCP and sends those SCSI commands over standard Ethernet. An iSCSI SAN consists of servers — with an iSCSI host bus adapter (HBA) or network interface card (NIC) — disk arrays and tape libraries. Unlike other SAN technologies, iSCSI uses standard Ethernet switches, routers and cables, and the same Ethernet protocol deployed for communications traffic on LANs (TCP/IP). It can take advantage of the same type of switching, routing and cabling technology used for a LAN.

Because iSCSI uses SCSI commands, relying on Ethernet only to transport the SCSI commands, operating systems see iSCSI-connected devices as SCSI devices and are largely unaware that the SCSI device resides across the room or across town.

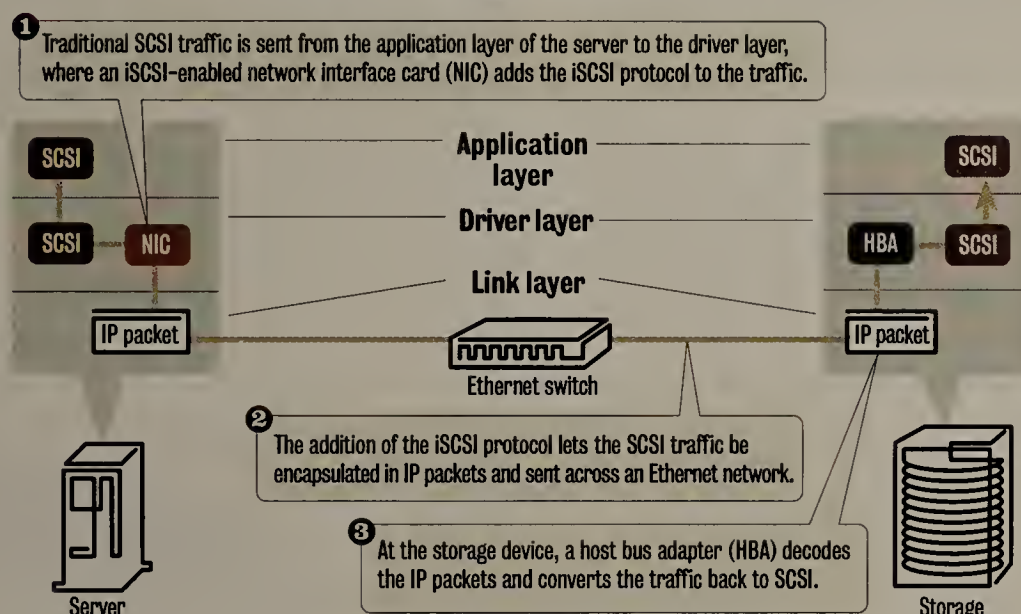
### Got great ideas

■ *Network World* is looking for great ideas for future Tech Updates. If you've got one and want to contribute it to a future issue, contact Features Editor Neal Weinberg (nweinberg@nww.com).

### HOW IT WORKS

### iSCSI

iSCSI uses Ethernet as the transport for data from servers to storage devices.



Most components inside these iSCSI devices are very familiar to network professionals, including RAID controllers and SCSI or Fibre Channel drives. The only added feature is the iSCSI protocol, which can be run on standard NICs in software or on specialized iSCSI silicon or HBAs that off-load the TCP/IP and iSCSI protocol.

iSCSI is built using two of the most widely adopted protocols for storage (SCSI) and networking (TCP). Both technologies have undergone years of research, development and integration. IP networks also provide the utmost in manageability, interoperability and cost effectiveness.

When SCSI is mapped to TCP/IP through the iSCSI layer, SCSI is freed from its parallel

bus structure, letting users extend network storage using Ethernet.

SCSI traffic at the application layer moves to the physical network interface (either an NIC using software or an HBA) then out over the Ethernet-based SAN to a storage device, where the SCSI command is decoded and presented to the storage operating system.

There are other components that can be added to an iSCSI SAN to facilitate inclusion of other storage protocols. These devices bridge the iSCSI protocol to Fibre Channel and SCSI devices. Bridging products let users deploy an iSCSI SAN without requiring retrofits to the entire storage infrastructure. This means that storage can be

transitioned to become iSCSI-compatible, and the existing storage can stay in place.

This bridging functionality lets users preserve their existing investment while migrating to an IP-based SAN. In addition to the bridging function, some of the protocol-conversion devices also can provide switching capability. This means that these devices can bridge iSCSI to another protocol and simultaneously route the command to the appropriate device.

The iSCSI draft specification has passed the final hurdle on its journey toward ratification, opening the door for vendors to begin shipping products based on the technology blueprint.

The Internet Engineering Task Force (IETF) said Wednesday that it completed work on the protocol and will now assign a request for comments number to it.

Devices such as iSCSI HBAs, iSCSI disk arrays, iSCSI tape and iSCSI to Fibre Channel/SCSI bridging products are available today, and more will be available throughout this year. Most of the products available today are prestandard, but all have undergone rigorous interoperability testing to ensure that they work in accordance with the standard.

iSCSI provides IT managers with a new option for solving increasing storage demands. By delivering the advantages of SANs using a familiar and ubiquitous Ethernet infrastructure, iSCSI unifies network and storage deployment, making SANs available to the masses.

*Mackin is IP storage product manager/iSCSI subgroup marketing coordinator at Adaptec. He can be reached at bryce\_mackin@adaptec.com.*

## Ask Dr. Internet

By Steve Blass

We recently upgraded our mail server to sendmail 8.11.6 and bind-9.2.1 on Solaris Version 8 from sendmail 8.9.1 and bind-4.9.3 on Solaris Version 2.5.1. The Solaris server is named ultra1.ourname.net, and before the upgrade there were no problems. Now "ultra1" is appearing on the e-mail address when we send e-mails outside our network. The e-mail appears as "address@ultra1.ourname.net," which didn't happen with the old version. We checked and changed all the sendmail.cf files

by adding a CM line and DM line into the cf file to masquerade all the names to locus.net, but that didn't work.

Configuring sendmail has changed, and you may not get the desired results simply by editing the DM line in sendmail.cf. An article at sendmail's Web site (see [www.nwfusion.com](http://www.nwfusion.com), DocFinder: 2135) says "Configuration files are contained in the subdirectory 'cf' with a suffix '.mc'. They must be run through 'm4' to produce

a '.cf' file." Set the MASQUERADE\_AS setting and have that picked up by the sendmail config. The FAQ and cf-README files provide detailed instructions. Additional Sun sendmail information is available from DocFinder: 2136 and 2137 that describes a solution to a similar masquerading problem in Sun's SMI sendmail.

**Blass is a network architect at Change@Work in Houston. He can be reached at [dr.internet@changeatwork.com](mailto:dr.internet@changeatwork.com).**



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## Cookie cookery

```
Server: Apache/1.3.12 (Unix) mod_ssl/
2.6.6 OpenSSL/0.9.6 mod_fastcgi/2.2.10
Set-Cookie: Apache=63.207.158.10.
289511031170813230; path=/; expires=Fri,
03-Sep-04 20:20:13 GMT
Connection: close
Content-Type: text/html
```

This header is from a request for the root page of Network World's Web server, [www.nwfusion.com](http://www.nwfusion.com), and the tool we used was Ipswitch's WS\_Ping ProPak (\$37.50; [www.ipswitch.com/Products/WS\\_Ping/](http://www.ipswitch.com/Products/WS_Ping/)), which has a feature that lets you retrieve Web pages as plain text (among other things).

By now you've probably figured out that the header line that is relevant to us is the one starting "Set-Cookie:." This is a request that tells a cookie-compliant browser to take the data following the request and create a file to store it in.

The name of the cookie file is up to the browser implementer — Microsoft Internet Explorer under Windows names cookie files by appending the second-level domain name from the server's URL to the current user's name. Thus, our cookie for Network World Fusion is named [gearhead@www.nwfusion.txt](mailto:gearhead@www.nwfusion.txt) and is stored in the folder "C:\Documents and Settings\gearhead\Cookies." Under the Netscape browser cookies are stored in a file named "cookies" that can be found in

"c:\netscape\users\default."

The cookie data is defined by six parameters. These are the cookie name, its value, the expiration date, the path for which the cookie is valid, the domain the cookie is valid for and whether a secure connection must be available when the browser returns cookie data to a server.

The name in our example is "Apache," and the value is "63.207.158.10.289511031170813230." The name is only significant to a server that sets the cookie, and you'll often see default values such as "Apache" and "SITESERVER" where a coding library has been used to handle cookies.

The domain is a critical part of this system because it defines the domain or sub-domain to which the cookie data will be sent with each browser request. The path also defines the start of a subtree under the domain's Web root to which the cookie applies, thus \info and \users under [myserver.com](http://myserver.com) could have different cookies. If a path is not set, it defaults to the URL of the document creating the cookie.

Of course, you could just as easily set cookies for each subtree and by setting the path "/" have the cookies returned with every request. We've looked at quite a few cookies, and we suspect that this feature is rarely, if ever, used. The reason is obvious — the overhead of extra cookies

is not significant, and it involves less work when Web site changes are required.

The expiration date is what you might guess, the date after which the cookie data is no longer valid. If a value isn't set, then the cookie — called a "session cookie" — is stored in memory only and deleted when the browser exits.

The designers of the cookie system never considered that someone might not want cookies to expire, so you'll often see cookies with expiration dates such as some date and time in 2038.

2038 is often the maximum year used for a really dumb reason: Active Server Pages in Microsoft Internet Information Server 3.0 and 4.0 and Microsoft Internet Information Services 5.0 have a small bug that causes an error — we quote from Microsoft Knowledge Base article Q247348 (see [www.nwfusion.com](http://www.nwfusion.com), Docfinder 2148): "This is caused by an overflow of the time\_t variable in the C/C++ programming language. This variable is a 32-bit integer value used as an offset in seconds from January 1, 1970. This variable has a maximum value of 2147483647, which only allows dates through 3:14:07 GMT on January 19, 2038."

An "overflow"! What can we say but "duh."

*Next week, more delicious cookies. Set your value to [gearhead@gibbs.com](mailto:gearhead@gibbs.com).*



## Cool Tools

Quick takes  
on high-tech toys  
By Keith Shaw

## IBM notebook promises eight hours of battery life

IBM recently introduced its ThinkPad X30 notebook, a 3.6-pound notebook that combines IBM power management technology and design features to stretch battery life to up to eight hours (when equipped with an optional second battery).

The X30 can use two batteries at the same time — one internal battery and one extended-life battery that attaches to the bottom of the notebook. IBM says its power-saving technology can intelligently manage power consumption between the batteries and analyze how much power is needed to perform a specific task in a specific environment. When that is determined, the system can reduce the power to each of the major subsystems appropriately.

The X30 also includes IBM's Access Connections wizard, which lets users manage wired and wireless connections, and switch between them, and IBM's Rapid Restore PC application, which lets users recover saved data after a software crash with the press of a button.

Another option is the X3 UltraBase, a 1.6-pound base with enhanced features. Users can connect to

the UltraBase to recharge the battery and use features such as a DVD or CD-ROM drive.

The X30 comes with Cisco Aironet integrated wireless (802.11b) technology and support for the 802.1x/Extensible Authentication Protocol security standard. It starts at \$2,000 and is available now. For more information, go to [www.ibm.com/thinkpad](http://www.ibm.com/thinkpad).

## CTX ships 23-inch flat-panel LCD monitor

CTX International recently expanded its FlatView series of LCD monitors with the H2300, a 23-inch monitor aimed at high-end professional users. The H2300 is targeted at professionals in the imaging, design, financial, medical, manufacturing and education fields.

Compatible with Macintosh and Windows computers, the H2300 has 1,600-by-1,200-pixel resolution, wall-mount capabilities and low power consumption. CTX says the H2300 emits almost no magnetic fields. In addition, two 2-watt speakers are built into the monitor to save desk space.

The unit costs about \$2,800.

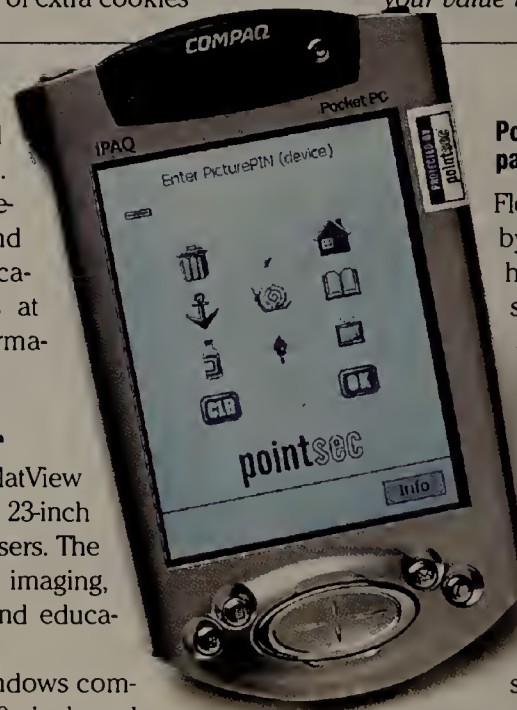
Go to [www.ctxintl.com](http://www.ctxintl.com) for more details.

## Secure your PDA with pictures

Pointsec Mobile Security recently announced PicturePIN, an application for PDA users that can replace passwords with a sequence of graphic symbols that appear on the logon screen.

The company says the application lets users create a "mnemonic story or phrase" using the symbols. This eliminates names or words and the need for written reminders.

For example, a password of "Women-Love-



## Pointsec lets users create PDA passwords with pictures.

"Flowers-Daily" could be created by using the face of a woman, heart, flower and a sun. Pointsec says that by having users create stories or scenarios with their passwords, the sequences become memorable yet random to others.

The PicturePIN sequence can consist of four to 13 symbols. While the application generates the graphics, the user can choose a preferred symbol set and its sequence. The location of the symbols on the screen also

changes with each logon sequence, which helps eliminate the possibility that someone watching over the shoulder could repeat the location of the icons.

Pointsec has products for Pocket PC and for Palm OS-based devices. Both products include 128- and 256-bit encryption based on the Advanced Encryption Standard algorithm. The system can encrypt data stored on the device and on removable media such as multimedia cards, and Secure Digital and Compact Flash cards.

Pointsec says decryption happens automatically on an as-required basis, on the assumption that the user logged on with the correct sequence. If the PDA is idling, the software places it in a suspended state — normal operation can resume by clicking the first two pictures of the PicturePIN code. A centralized administrative feature lets system administrators reset the password locally or via LAN in case end users forget their code sequences.

Go to [www.pointsec.com](http://www.pointsec.com) to learn more.

*Shaw can be reached at [kshaw@nww.com](mailto:kshaw@nww.com).*

IBM's X30 can use two batteries at the same time.



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## EDITORIAL

John Dix

## The VON Showdown roster

A few weeks ago we challenged a handful of vendors to participate in a Network World Showdown pitting IP Centrex suppliers against IP PBX vendors at the Voice on the Network conference Oct. 7 in Atlanta ([www.von.com](http://www.von.com)). But we didn't anticipate the problems we would encounter.

Of the six vendors we challenged, only three accepted. On the PBX side we had asked Avaya, Mitel and Vertical Networks to participate. Mitel and Vertical are in, but Avaya begged off, saying it sells IP-based PBX systems and equipment that carriers can use to offer IP Centrex services, so it doesn't want to say one is better than the other.

That didn't represent a problem because we had a host of other players wanting in. We asked Alcatel to step into the breach.

On the IP Centrex side we called on Equant, Genuity, and GoBeam. GoBeam is the only one that accepted. The Bay Area company offers services throughout California and is entering into wholesale arrangements in other states. Verizon, for example, will use GoBeam to offer IP Centrex services in Chicago.

Equant pleaded the Fifth like Avaya, saying it offers both flavors of IP telephony and doesn't want to favor one. And we simply jumped the gun on Genuity, believing the company would have an IP Centrex service by showtime when in fact it will not.

But finding other IP Centrex service suppliers to fill the void proved difficult. While the market looks promising, these are still early days.

Knowing that SBC Communications and BellSouth have services in the works we approached them. SBC said it is on track to announce IP Centrex in Illinois and California in October, but couldn't get a representative to the show. And even though VON is in its backyard, BellSouth said it couldn't muster a speaker to talk about the service it plans to have announced by showtime.

But PeerCom accepted. This Bristol, Tenn., company offers IP Centrex services to small and midsize businesses in the Tri-Cities region of Tennessee-Virginia via wireless access links.

And to fill the last IP Centrex slot we invited an equipment supplier — NetCentrex — that has agreed to represent one of its service supplier customers, which unfortunately has to remain anonymous.

As promised, we'll circulate a request for information based on a fictional company and have the IP Centrex and IP PBX camps come prepared to argue the merits of their respective approaches. Hope to see you there.

— John Dix  
Editor in Chief  
[jdix@nww.com](mailto:jdix@nww.com)

### Hiring practices under fire

Regarding the story "Resumés pile up, yet key jobs remain open" ([www.nwfusion.com](http://www.nwfusion.com), DocFinder: 2129): What really gets me going is the short-sighted, narrow-minded, can't-think-straight hiring manager who is trying to find exactly the perfect fit. The quotes in your story from the hiring side were of trying to find applicants who had perfect credentials, and vast and narrowly focused experience that exactly fits the job description.

What happened to training? Why not find someone with a track record of excellence in prior jobs who had to learn a new skill? Why not accept that someone with 20 years in the business probably knows a lot about all aspects of computers and networks and can learn the latest and greatest variant?

And why not think a little out of the box? Maybe the new hire will share the cost of the training with you and work for 50% until qualified. That might produce a more loyal employee. Even better, pay for the training yourself but make the employee agree to repay if he leaves within a few years. Stop looking for stereotypes — someone who has 15 years of varied experience probably will be a more valuable team player than a 25-year-old.

This constant focus on perfect credentials is self-defeating. People learn new skills all the time. Whether they can learn is more important than what they know.

Besides, how can you beat the competition if you hire folks who never push the envelope, who already know all there is to know? Why not look for someone with a track record of innovation and creative thinking who will help differentiate you from the competition?

Peter Thornton  
Annapolis, Md.

E-mail letters to [jdix@nww.com](mailto:jdix@nww.com) or send them to John Dix, editor in chief, Network World, 118 Turnpike Road, Southborough, MA 01772. Please include phone number and address for verification.

# opinions!

Like others quoted in your story, I am a senior-level IT person who can't get an interview even when the job fits my background exactly. I read an interesting statistic that might give a clue to the problem. *CIO* magazine recently interviewed more than 500 CIOs and asked them what was the most important skill a CIO should have.

Only 10% of them listed technical skills as important. Communication was the most often-cited skill. When the top people don't know technology from a hole in the wall, it doesn't bode well for people looking for positions below them.

Debbie Joy  
Phoenix

This is the problem and frustration those of us looking for work face: hiring managers looking for "exact fits" for technology positions. They just aren't going to find them, and there's no need to look for them, either. As a hiring manager, staffing and building MIS departments over the past eight years, I would look for personality traits in the interview that told me the candidate had the desire and aptitude to learn. This meant as much to the success of my department as did a candidate walking in with the exact skill set fitting the job description.

Because the technology changes so rapidly, it's very rare that you will find "exact fits," if ever. What should matter is if the candidate can learn the technology and learn it quickly. Good quality people in high tech aren't the ones who know everything there is to know about your system and applications before they walk in the door. The candidates that provide the greatest return on investment are those who prove they can learn and contribute quickly after being hired. There is a lot of talent sitting on the sidelines right now being passed over because of the "exact fit" mentality, and it's a shame, because the organization loses.

Joe Daldegan  
Lone Tree, Colo.



**More online!** [www.nwfusion.com](http://www.nwfusion.com) Find out what readers are saying about these and other topics. **DocFinder: 2125**







## STRATEGY SESSION

Jeff Kaplan

It's been more than a month since IBM announced its \$3.5 billion acquisition of PwC Consulting. While the response has been generally positive compared with the overwhelming criticism of Hewlett-Packard's ill-fated attempt to acquire the same group for \$18 billion two years ago, many customers

wonder if IBM can successfully integrate PwC Consulting into its corporate culture. IBM's move also speaks to fundamental shifts in the IT/network industry that could have more profound implications.

IBM's announcement came on the third anniversary of Lucent's acquisition of International Network Services (INS), at the time largest independent network consulting company in the world. When Lucent announced its acquisition plan, it was to become the "IBM of the communications industry." Ironically, Lucent marked the third anniversary of the acquisition with a decision to spin off what little remains of INS for a couple of pennies on the dollar of its investment.

Today, IBM is paying \$200 million less than Lucent paid for INS three years ago and getting more than 10 times the number of people, skills, client base and brand recognition. My guess is IBM will get a lot more value out of its PwC Consulting acquisition.

Few may realize IBM has been successfully recruiting business consultants from the Big 5 accounting firms for years. While many PwC Consulting professionals might have been unhappy with the idea of joining HP during the heyday of the Internet boom, those who have

# Goodbye, independent consultants?

survived the onslaught of the Internet demise and accounting industry implosion will find IBM's relative stability a welcome refuge.

Interestingly, IBM has laid off more than 15,000 of its IBM Global Services employees, more than 5% of its workforce, since June 30. With the economy continuing to fail and corporate spending on IT stagnant, how can IBM justify acquiring 30,000 PwC consultants?

Simple. IT and networking are no longer technology issues; they are now truly business issues. Acronyms such as ROI and TCO have replaced LANs and VPNs in everyday discussions between IT/network managers and vendors. Vendors who can't translate the value of their products and services into business terms and integrate their technology into their customers' business processes are being turned away.

It might sound clichéd, but IBM's move confirms the end of an era when technology drove business. Business now drives technology. Many IT/network managers are seeing this as they are pushed to more effectively apply technology to meet business objectives.

Expect other vendors to make investments in consulting firms or build service organizations to win and retain customers. A casualty of this trend will be the objectivity of IT consultants who are no longer vendor-independent. Savvy managers will challenge vendor-employed consultants to prove their objectivity and willingness to support multivendor setups as the real test of their sincerity and long-term success.

*Kaplan is managing director of THINKstrategies, a consultancy in Wellesley, Mass. He can be reached at [jkaplan@thinkstrategies.com](mailto:jkaplan@thinkstrategies.com).*

**Savvy managers will challenge vendor-employed consultants to prove their objectivity . . . .**



## SPEAKING THE LANGUAGE

Linda Musthaler

In my 10 years of writing for Network World, no article has prompted as much reader feedback as my July 15 column, "NetWare: It just works" ([www.nwfusion.com](http://www.nwfusion.com), DocFinder: 2127). The gist of the argument was that NetWare, well, just works. It's predictable, reliable and stable. You can have a NetWare server and not spend an inordinate amount of time servicing it with reboots, updates, service packs, security patches and the like. I lamented that my company abandoned NetWare in favor of Windows NT about five years ago, and now I want my NetWare back.

A few people wrote to ask whether we have tried Windows 2000, which inarguably is a more stable product than NT. Indeed, we have upgraded to Win 2000 and acknowledge that it is more stable — provided our systems administrator spends time every day applying the latest patches. Last Friday, he installed security patches. By the time he had finished, Microsoft already was sending out new patches.

The most vocal pro-Microsoft comments came from Derek Flickinger, who says the Windows server products are "reliable and really kick butt if implemented properly." In his view, "most of the recent Microsoft-related major security issues have been because systems administrators don't keep up with the appropriate level of administration for their systems and don't keep an ear out for what Microsoft outright tells them they need to do." He adds that "proper planning and keeping up with an understanding of the way the pieces need to fit together and the way they are designed to work" are the keys to a reliable Windows platform.

Derek, I agree with you 100%. I'm sure this works for companies that are fortunate enough to have a well-trained staff dedicated to constant Windows server administration. Smaller companies, however, may not be able to devote the resources to keep an ear out for the barrage of Microsoft's service releases and advice.

That's why many network managers still love their NetWare. Here's one, and there are more comments online at DocFinder: 2128.

From a director of IT: "I also can attest to the good performance and

# Readers love their NetWare

uptime of our Novell servers. The Win 2000 servers we use have had to be rebooted 16 times just this year for security updates or for service packs. Our Novell servers only need to go down for electrical work in the building or for major service packs, which was only one time this year. I am not a financial wizard but I can confidently state, based upon uptime alone, my organization gets a better return on investment from our NetWare servers than our Microsoft servers."

Ron Austin of ActionFront Data Recovery Labs points me to the company's recent study on data loss and recovery. According to the study, "Data loss was consistent across all operating systems with the exception of NetWare. NetWare users showed significantly less data loss than users of other operating systems." (Read the full release at DocFinder: 2126.)

For an interesting perspective on why your value-added reseller might have advised you to move to Windows, consider this reply I received from a VAR: "A VAR named Tom had about 50 Novell clients. About once a month he would call them and ask how things were going, and he would always get a resounding 'Great, no problems.' One day one of his more adventuresome clients, Client A, told him it had heard Microsoft had this great new network system that was better than anything. Tom took a few Microsoft network courses and informed Client A that for lots of money he would be able to replace all its old NetWare with shiny new Microsoft servers. Client A was happy; now it had the best.

"About a month later when Tom was making his usual calls, Client A informed him that it was experiencing a few problems. Tom was happy to go to the site, do some tweaking, install some patches and present a bill for several hundred dollars. Next month the same thing happened. On the third month, when Tom started making his calls, he had a new approach: 'Hello, client. Microsoft has a wonderful new network system that's much cheaper and better than Novell. I have this great presentation I'd like to show you...'"

*Musthaler is vice president of Currid & Company, a Houston technology assessment firm. She can be reached at [linda@currid.com](mailto:linda@currid.com).*

**Smaller companies may not be able to . . . keep an ear out for the barrage of Microsoft's service releases and advice.**



# Don't make me come over there.



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iLabs team weighs

# wireless security options

The NetWorld+Interop 2002 InteropNet Labs (iLabs) will focus on three technologies this week in Atlanta: wireless security, IP storage and Multi-Protocol Label Switching.

Hot-staged in a warehouse near San Francisco, dozens of iLabs volunteers combine products that employ these technologies and deploy them on a single network to test interoperability and compatibility. Once the network is assembled and tested, the iLabs team packages and ships it to Atlanta, where show attendees can get a hands-on experience with the products tested.

*Network World* holds exclusive access to the iLabs hot stage and places members of the Network World Global Test Alliance on the iLabs technology teams to get firsthand knowledge of the testing taking place within them. Last April we covered all three technologies ([www.nwfusion.com](http://www.nwfusion.com), DocFinder: 2031).

In this round of iLabs testing we focused on wireless security, with Global Test Alliance member Joel Snyder, a senior partner at Opus One participating in the testing and gleaning information useful to enterprise network professionals.

In this exclusive package of stories, Snyder reports on how the iLabs wireless security team divided its testing into four parts, each addressing a different security strategy for wireless networking based on differing enterprise requirements.

The iLabs wireless network is based on 802.1X, the newly minted IEEE standard for authentication and authorization in LANs, especially 802.11-based wireless LANs. The iLabs team tested five 802.1X clients, five 802.11b wireless access points and six authentication servers.

The second wireless security strategy is based on browser-based authentication, for environments where maximum compatibility with existing equipment is required (see page 52). The third wireless strategy uses IP Security as an authentication and security mechanism (see page 52). The final strategy shows the much-maligned wired equivalent privacy (WEP) encryption algorithm as at least an alternative to having no security at all (see page 54).

iLabs engineers will be on-hand at NetWorld+Interop 2002 Atlanta to answer your questions about the specific technologies.

See the iLabs schedule at DocFinder: 2140.



**Testers create largest 802.1X interop lab, demo Web-based authentication and wireless IPSec, and show how WEP can work.**

BY JOEL SNYDER, NETWORK WORLD GLOBAL TEST ALLIANCE

## Wireless security with 802.1X

Network professionals in search of technology that melds authentication, encryption and wireless LANs will find the IEEE 802.1X specification is up to the job.

As a Layer 2 authentication protocol, 802.1X doesn't let anyone on the network until they've been properly authenticated. With built-in hooks for setting wireless encryption keys, 802.1X also solves the worst problems of wired equivalent privacy (WEP): avoiding well-known, widely distributed keys. The only problem with 802.1X is that it is an emerging technology that requires upgrades to authentication servers, client software on all PCs, and appropriate configuration in the wireless access points.

New products supporting 802.1X have popped up rapidly, and iLabs comprises the largest-ever public demonstration of 802.1X. Since the last round of iLabs testing in May, the team has added a new authentication server (Aegis, from Meetinghouse Data Communications), a Mac OS X 802.1X client (also from Meetinghouse), and prototype Protected Extensible Authentication Protocol (PEAP) support in Windows XP client and Cisco's ACS authentication server, to its secure wireless deployment.

PEAP and Transport Layer Security (TLS) are two proposals that add support for legacy authentication mechanisms like username/password and token cards to the 802.1X spec. However, neither has reached standards status. The Internet Engineering Task Force (IETF) requires that any standardized protocol be proven to work, and having multiple interoperable implementations is a critical step along that path.

TLS offers support for a wider range of legacy authentication methods and was implemented first, so it should win favor among network managers. However, RSA Security, Microsoft

and Cisco proposed PEAP. While company affiliation isn't supposed to be important within the IETF process, proposals brought in by these networking powerhouses are generally taken very seriously.

We tested different authentication methods to see how well we could mix and match products in the iLabs network. MD5, the simplest authentication method in the 802.1X world, worked pretty well. Some wireless access points, such as those produced by Symbol, don't support MD5. This is actually a good thing — MD5 is not appropriate for wireless 802.1X authentication, because it does not set up WEP keys.

When we moved onto TLS using digital certificates, the only authentication server that had trouble supporting this method was Microsoft.

We tried to use TLS authentication with a beta version of .Net Server. We found it easy to set up the .Net 802.1X authentication server, but for MD5 authentication only. When we tried to move to TLS authentication, using digital certificates, the .Net Server would not recognize our Netscape certificate authority. Microsoft assumes a total Microsoft implementation, using multiple servers, Active Directory and the Microsoft certificate authority, which wasn't the interoperability demonstration we sought.

Despite the .Net Server setback, we concentrated our testing on the 802.1X servers, adding two new products (from Cisco and Meetinghouse) to the list and retesting servers from Funk Software, Hewlett-Packard, Microsoft and Secure Computing.

The results are encouraging. Although we are dealing with new products and beta code, we've worked with the vendor development teams to get things to work. For example, Wind River, the OEM behind many popular access points, debugged and modified its software to pass PEAP properly after discovering an incompatibility during PEAP testing.





# Browser-based wireless security

For some companies, "wireless security" is more about access control than privacy.

In that case, standard security measures like wired equivalent privacy (WEP) just aren't useful. For example, in a conference center or public hot spot, the primary security application boils down to tracking how long individuals are on the network in order for the proprietor to charge them correctly. Moving this technology into the corporation typically requires less emphasis on blocking access to unauthorized individuals.

To illustrate this example, the iLabs team built a wireless network that required users to authenticate to the network using only a browser.

Vernier Networks, Reef Edge, Colubris and Blue Socket have stepped up to provide browser-based authentication for enterprise networks. With browser-based authentication, the user must authenticate with a username and password (or other authentication technique, such as a one-time password token) through a typically encrypted browser window before their system can access to the network. Of course, these products are susceptible to a num-

ber of different attacks, such as system masquerading, where someone assumes the Ethernet media access control address of a legitimate user and takes over their session. But where the goal is general access control, not absolute secrecy or accuracy, this technique is useful.

Our test network for this technology was based on Vernier's product line. With proper configuration, this worked great: The Vernier box intercepted DNS requests and Web requests, and pretty much boxed us into authenticating before we could move on.

One of the more useful extensions to this technique is something Vernier calls 802.1X sniffing. With 802.1X sniffing, the access manager — which would block access to the internal network — sits between a wireless access point and the rest of the world. The goal of this dual-mode configuration is to support 802.1X and non-1X clients.

The iLabs team showed this concept, linking Cisco and Karlnet access points, a Vernier Access Manager, and Microsoft's .Net authentication server, all connected using a Macintosh client.

In this environment, 802.1X-enabled clients authenticate and are placed onto the

secure site of the network, with WEP encryption enabled. This authentication dialog is "sniffed" by the inline access manager, so when users successfully authenticate using 802.1X, they have access without any further logon process. If users don't have 802.1X software, they connect to the wireless network and see the browser-based authentication window. When users authenticate using their browser, they're connected to the "guest" virtual LAN.

While a company could easily require its own employees to have 802.1X software and configuration on mobile systems, it might not have the same requirement for guest users. The idea is to maintain a single wireless infrastructure, with trusted users given access inside the corporate firewall, and guests and visitors placed outside.

— Joel Snyder

## Wireless IPSec

For many companies, wireless networks have the same low-level security afforded on the Internet: not controlled, not authenticated and not trusted. So why not treat wireless LAN users like Internet users and bring them in from outside the firewall via VPN technologies?

The strategy is simple: Put your wireless network outside the corporate firewall, and give wireless users the same client tools as Internet users, including a VPN client and some authentication information. Because IP Security (IPSec) has one of the strongest security models available in networking, using it to secure wireless networks gives even stronger security than offered by wireless security tools like 802.1X. In addition, where VPN access via the Internet is common, most users will already have the necessary client software installed on their laptops, so the transition from home use to wireless use in the office is smooth and seamless (see diagram, right).

The iLabs team built a wireless network where access to the corporate LAN was controlled by a Nokia VPN/firewall device. We used smart cards from Schlumberger, which give a strong two-factor authentication. In this case, the access point was an SMC 802.11a (54M bit/sec) model.

If you consider using this strategy, keep in mind some important issues. One main difference between 802.1X and IPSec products is that 802.1X is a link-layer authentication system, while IPSec is a network-layer VPN technology. In the IPSec case, this means that anyone who wants to use the wireless network as a carrier, without going onto the corporate LAN, can do so without restrictions.

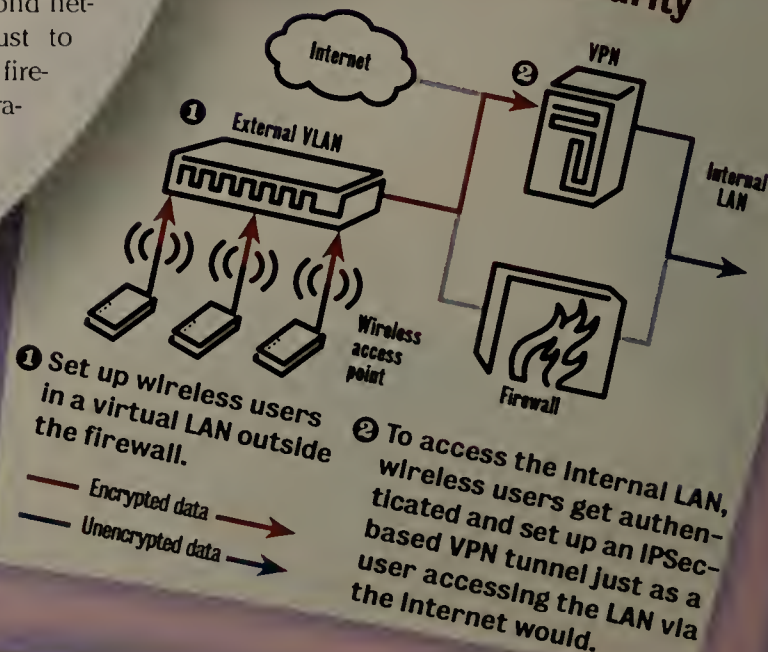
It's only when the packets try to leave the wireless environment that the IPSec security gateway blocks access. At the same time, only IP is supported by IPSec. In iLabs testing, that wasn't a problem, but we didn't care about services such as IP multicast. If you do, or if you have IPX or Appletalk, IPSec is not the right solution.

Another issue with this strategy relates to distribution. Wireless LANs can be spread throughout a corporate campus, and bringing the entire LAN back to the data center, where the VPN concentrator is located, can be a complex undertaking. Virtual LANs, an obvious option, must be used with care. Virtual LAN switches are not designed as security devices, and packets can and do hop virtual LAN boundaries. Without virtual LANs, though, the question of running an entire second network infrastructure just to pull wireless outside the firewall can increase costs dramatically.

VPN concentrators also can be a stumbling block. A concentrator sized for a moderate number of users connecting via dial-in or DSL service might not be able to handle the encryption load of wireless users connecting at LAN speeds directly to the corporate network.

— Joel Snyder

### Putting IPSec rules to wireless security





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# WEP is bad, but better than nothing

The wired equivalent privacy encryption algorithm has a bad reputation because it's relatively easy to crack and it's difficult to deploy. But sometimes it might be your only option. The iLabs team built a small wireless LAN secured by WEP-using devices that supported no other security mechanism. We can report that these devices interoperated while using WEP, even when we employed nonstandard extensions such as 128-bit encryption.

Our network was based on the popular WAP11 wireless access points from Linksys. Although it's not designed as an enterprise access point, the WAP11 has attracted many adopters because of its low price and easy setup. The devices connected to these WAP11 boxes were PDAs and wireless Ethernet phones, which typically don't work well with other wireless security strategies.

Sharp's Zaurus is a Linux-based handheld, which makes an excellent platform for deploying small, portable applications. Like all PDAs, the Zaurus has strictly limited memory and a relatively slow CPU. Adding wireless to the Zaurus wasn't as simple as plugging in a wireless card; we had to find drivers, card management tools and a recompiled kernel to add support for the card we chose. But once we figured all that out, the first real test against our Linksys WAP11 wireless access point worked.

Symbol's NetVision phone is another example of a device for which WEP fits best. NetVision is a very cool but deceptively simple device. It looks like a wireless phone without a base station that connects directly to your 802.11b infrastructure, talking H.323 protocols directly to your voice-over-IP network. You need the usual H.323 gatekeeper to run things, but no Symbol-specific or proprietary pieces. NetVision supports a proprietary high-security wireless protocol based on Kerberos that would have required Symbol access

points and additional hardware on the network. We used WEP to add basic security against our Linksys access points, and had complete interoperability with devices on and off the network the first time out.

WEP is useful for devices such as printers, which might be located in remote areas yet still need to connect back to the corporate LAN. Most wireless vendors have an Ethernet-to-wireless adapter that can be used for devices such as printers or Replay TV.

One of the advantages of WEP in this type of network is that the WEP keys don't have to be widely distributed to a lot of people (see our WEP primer, [www.nwfusion.com](http://www.nwfusion.com), DocFinder: 2040). Programming phones and PDAs is hard enough that you probably wouldn't ask an end user to do it. This helps to reduce some of the obvious vulnerabilities of WEP, such as people sharing the keys

or writing them down and leaving them around public areas.

Although most modern wireless card firmware has been secured against the initialization vector problems exploited by tools such as AirSnort, PDAs and embedded devices, in particular, they may not be as up to date as wireless cards for laptops and PCs. Thus, the advice to change WEP keys frequently still holds: it may be painful, especially in small, portable, devices, but it's an important consideration in WEP-based networks.

— Joel Snyder



# MPLS and IP storage testing update

The iLabs MPLS and IP Storage teams will continue testing at NetWorld+Interop in Atlanta.

For the Multi-protocol Label Switching team, which focused on basic MPLS interoperability last May ([www.nwfusion.com](http://www.nwfusion.com) DocFinder: 2038), the goal this time is to demonstrate interoperability of higher-level services running over a multi-vendor MPLS backbone.

The team will build a set of label-switched paths across a core of MPLS devices. Within this core, the team will test how multiple vendors handle failover and resiliency while interconnecting. Once the core is stable, the team will test services running on top of MPLS, including Martini Layer 2 VPNs based on the Martini draft specification, standards-based Layer VPNs and Virtual Private LAN Service (VPLS) protocols.

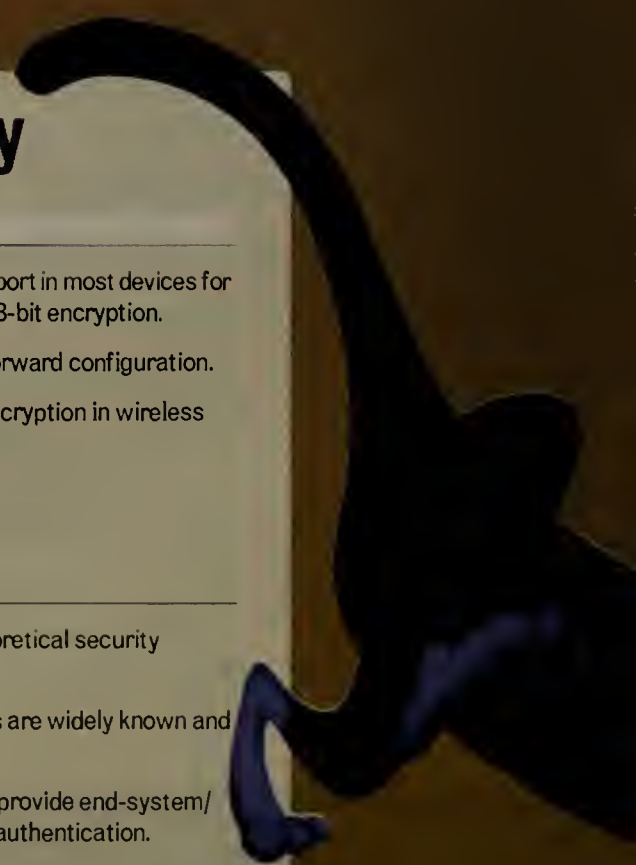
Using gear from Cisco, Extreme Networks, Foundry Networks and Riverstone Networks, the team will build and test a hub-and-spoke VPLS network over the MPLS core, pushing the brains of a multisite Layer 2 VPN into the network. For Layer 3 VPNs, the iLabs team will evaluate at how natively current MPLS equipment can interoperate when passing IP V6 traffic.

For the IP Storage team, the testing will focus on the same iSCSI to Fiber Channel integration issues as it touched in May (DocFinder: 2039). In this round of testing, the team will be testing iSCSI to Fibre Channel links both in the iLabs booth and across the show's network to gear located in vendors' booths.

— Joel Snyder

## The ups and downs of wireless security strategy

|      | 802.1X  | Browser-based security   | IPSec  | WEP  |
|------|---|--|--|--|
| Pros | <p>Best match of security and wireless requirements.</p> <p>Enforces authentication and encryption at the link level, supporting all protocols.</p> <p>Gives low-overhead alternative to support wired and wireless environments.</p>                 | <p>Greatest compatibility as a majority of wireless devices have a browser.</p> <p>Easy for guest users and visitors to use.</p>   | <p>Highest security model available; can use digital certificates or two-factor authentication.</p> <p>Generally available for computing platforms.</p> <p>Can be met with existing VPN infrastructure (for example, Internet telecommuters).</p>  | <p>Good support in most devices for 64- and 128-bit encryption.</p> <p>Straightforward configuration.</p> <p>Built-in encryption in wireless card.</p> |
| Cons | <p>Non-Windows-XP users will need to buy and install client; clients not readily available for all platforms.</p> <p>Not all access points support 802.1X.</p> <p>802.1X EAP-compatible RADIUS authentication server needed to grant/deny access.</p> | <p>Doesn't work with embedded devices.</p> <p>Doesn't provide encryption.</p> <p>Traffic easily spoofed in wired or wireless environments; doesn't protect wireless-to-wireless connections.</p> | <p>IPSec configuration and policy distribution is complex and problematic, especially across platforms and vendors.</p> <p>Performance at LAN speeds can be problematic for laptops; central VPN security gateway might need to be upgraded.</p> <p>Doesn't support non-IP or multimedia IP; doesn't protect wireless-to-wireless connections.</p> | <p>Many theoretical security problems.</p> <p>WEP keys are widely known and shared.</p> <p>Does not provide end-system/end-user authentication.</p>    |







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# IDS tools smarter

**Customer dissatisfaction with signature-based intrusion-detection systems leads to anomaly-based appliances.**

■ BY PAUL DESMOND

Adar Meroz has worked with intrusion-detection systems from leading vendors for the past two years. But the vice president of networking and security for Diskal Systems Group, an Israeli service provider, says he has struggled to get them to work effectively.

Most IDSs rely on signatures, or pieces of code that identify known attacks, to spot attacks that are in progress. That means, for one, that the attack has already started by the time Meroz finds out about it; often, damage has already been done. Second, it's a chore to constantly install new signatures and they are delivered only after a new form of attack is already in the wild — which again is often too late. But perhaps worst of all, Meroz found it difficult to build all the rules that would let the IDS send commands to attached routers and firewalls to actually halt the offensive sessions.

"Very few people know how to build up the rules in the right logical order" to make an IDS work effectively, he says. "Even the smallest mistake, a rule not in the right spot, and you'll get many false positives." Which brings up another IDS bugaboo — if they are not tuned just right, they can generate such a sea of alerts that it becomes nearly impossible to ferret out which alerts relate to actual attacks.

However, where there is such user pain with a given product category, there also is opportunity for new players. True to form, companies including IntruVert Networks, NFR Security, OneSecure, Recourse Technologies and Vsecure Technologies are emerging with IDSs that, if they use signatures at all, it is only as one of several ways to detect attacks.

Vendors have developed schemes that let their devices identify attacks more by detecting aberrant traffic patterns or anomalies in specific packets than by relying on signatures. Many vendors deliver these wares in an appliance format that makes them easier to deploy than their IDS predecessors. And several have features such as automated signature updates, advanced reporting mechanisms and features that let the IDS thwart an attacker at the door, all of which mean they require fewer people to operate.

They can't be delivered fast enough to suit current IDS users.

"We see a predictable pattern where clients ask a lot about intrusion detection and who has the best products," says John Pescatore, research director for Internet security at Gartner. "Six months later they come back and ask if there's somebody they can outsource to."

## **Too many positives creates a negative**

The biggest pain point, he says, is the false positive issue. Reducing the number of false positives requires users to "tune" the IDS to ignore certain signature patterns that don't apply to their networks. At the simplest level, it might mean not checking for a known Microsoft Internet Information System attack pattern if you use only Apache Web servers.

The problem is, it takes lots of such rules before the IDS is sufficiently tuned to cover all the nuances of any network without generating an inordinate number of false positives. Every time there's a change to the network configuration, the IDS likely will have to be updated accordingly.

"Therein lies the problem," says Joe Krull, vice president of security for Vsecure. "You can't define exactly a static [intrusion-detection system] to work with a dynamic network. So you keep the rules very open, and you start to get a lot of false alarms."

Rebecca Bace, CEO of security consultancy Infidel, serves as lead forum faculty member for the Institute for Applied Network Security, which has hosted a number of forums for IDS users. "The user constituency has spent enough time in the trenches to understand that [signature-based intrusion-detection systems] are not sufficient," she says. "I've heard a lot of users say that when there's a competitive product available, their current [IDS] is out the door."

Competitive products are now available, and a lot more will be coming soon. Bace, who is involved with IntruVert and other security companies in her role as a venture capital consultant with Trident Capital, says there



are about 40 venture capital-backed startups in the IDS arena.

### A new IDS tack

While companies such as IntruVert, NFR, OneSecure, Recourse and Vsecure differ in their exact approach to the intrusion-detection problem, many share similar characteristics. They are easy to deploy, owing to their appliance form factor and their ability to essentially configure themselves.

Each vendor uses anomaly-detection techniques to augment or replace signatures. Depending on the product, these techniques might let the devices detect improper use of communication protocols, attacks meant to take advantage of vulnerabilities in specific applications and changes in traffic patterns that might indicate an attack. Some vendors claim to be able to thwart distributed-denial-of-service attacks by identifying these abnormal traffic patterns.

A number of vendors look for protocol anomalies, which include packets that are too long or contain the wrong data type. The IDSs also might look for state transitions, or tasks performed out of sequence. Most Internet protocols have well-defined handshaking routines that take place before or while data is exchanged. Intruders might try to deliberately perform certain tasks out of sequence in an attempt to exploit a vulnerability of a host or cause a buffer overflow, letting them take over the host.

It's still possible that an IDS trained to look for protocol anomalies will produce false positives, says Fred Kost, vice president of marketing and product development for Recourse, which was acquired by Symantec last month.

"You could pick up something that's a protocol anomaly but it's not malicious, like maybe an old mail sever application that didn't implement [Simple Mail Transfer Protocol] correctly," he says. Users will identify such anomalies soon after installing the IDS and can write scripts to filter them out.

Some of the new IDSs also support automated signature updates, where signatures are pushed out to a server on the user's site, which then delivers them to individual IDS sensors. The products also typically can handle higher speeds than traditional IDSs, particularly IntruVert's IntruShield, which can monitor up to 2G bit/sec of traffic in full-duplex mode, NFR's Network Intrusion Detection (NID) and Recourse's Manhunt. Finally, if users enable the feature, devices including IntruShield, NID and Vsecure's NetProtect can stop an attack, either by dropping packets or resetting IP connections.

That means users don't necessarily require a security professional to be on the scene at all times, Krull says, which is a reality in many companies. "There's a huge disparity between the level of skills and

the complexity of the products, especially with an [intrusion-detection system] product," he says. "In most organizations, the person stuck with security is the junior systems administrator, because nobody wants to be saddled with the responsibility of keeping patches up to date."

### Protecting Fishman

Diskal's Meroz confirms Krull's assessment. Since early April, he's used NetProtect in production mode to protect a cluster of a dozen servers that Diskal operates for Fishman Networks, an Israeli retailer. For the first time, he can use an IDS to

for a short time.

NetProtect doesn't use signatures at all, which eliminates the chore of installing signature updates and tuning the device afterward. "Maintaining this system takes us about one-fourth of the time it took us to maintain the other [IDS]," Meroz says.

### Shielding Cal State

Chris DaSilva, network architect and engineer for California State University at Hayward, has had a similar experience during his beta test of IntruVert's IntruShield, which began in late March. He says IntruShield installed in about 15 minutes,

administration, letting different administrators monitor the portions of the network for which they are responsible. DaSilva says that feature will let the eight administrators who are responsible for the different schools and administrative offices within the university each monitor their own network segments.

DaSilva says he also likes IntruShield's ability to drop packets or reset connections on its own. "That's our goal, to let it drop packets," DaSilva says. "We can set what we want to be sensitive to and what we're comfortable with, and let it fly."

### Palm's manly defense

Matt Archibald, director of global IT security for Palm in Santa Clara, needed a tool that would provide a high level of risk management, didn't require a lot of staff and could operate at near-gigabit speed. He opted for Manhunt and Mantrap products from Recourse.

Mantrap is essentially a honeypot intended to trap intruders, while Manhunt is an IDS that supports protocol anomaly detection and statistical correlation and analysis. It can support signatures, including those imported from other IDSs. Palm uses both products to detect internal and external threats.

"Manhunt has saved our butts already with some of the newer viruses propagating, Trojans like Nimda and Code Red," Archibald says. Manhunt caught both worms at least 48 hours before other security vendors alerted Palm to them.

Correlation capabilities in Manhunt let it winnow down thousands of events to maybe a couple of dozen that require further investigation, he says. "So you really don't need to tune anything out," as with traditional IDSs. "There's far less to look at."

Manhunt also is able to keep up with Palm's high-speed links, most notably the T-3 lines that connect headquarters and data centers, and the Internet connections for Palm.net, the ISP the company operates for wireless users.

He doesn't miss having to keep up with signature updates, a process he knows well from previous stints as a consultant. Deploying new signatures meant testing them for a few hours first in a staging area, a process he acknowledges most users probably don't go through. He says that is a mistake, even with the new automated update features.

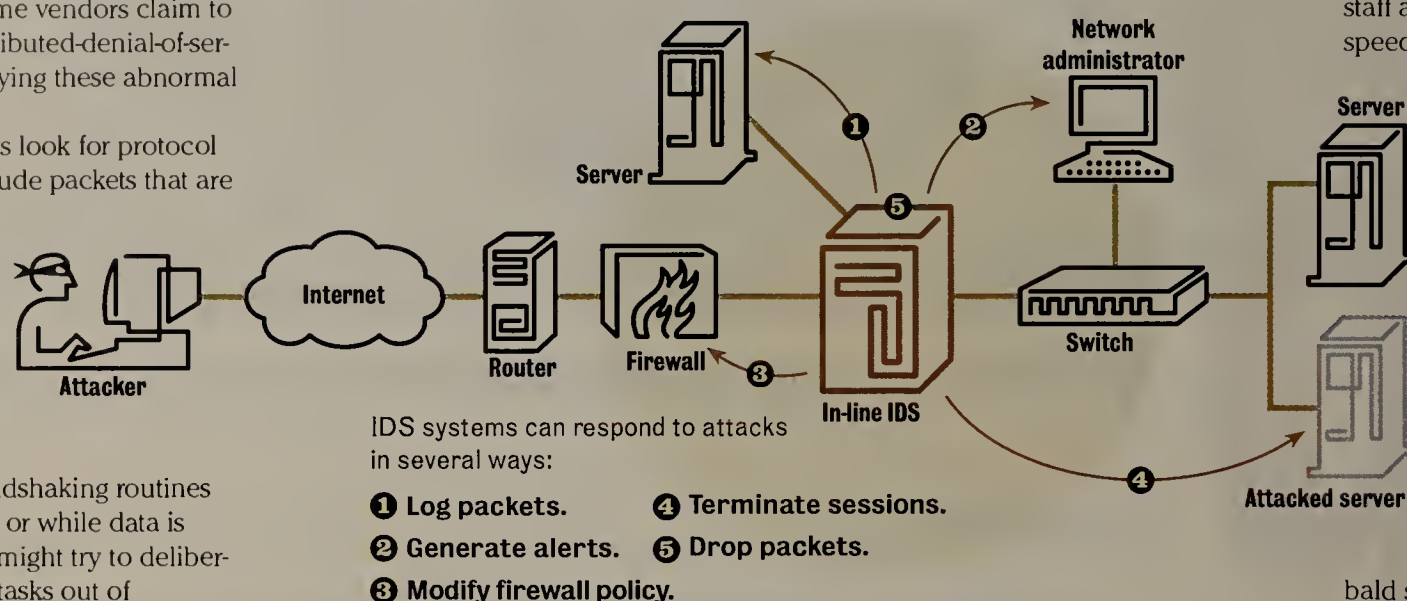
"Never assume that something you automate to grab code for you is doing the right thing," he says. "You need to validate that you're not opening another hole." A word to the wise.

*Editor's note: NetScreen announced on Aug. 29 that it plans to buy OneSecure for about \$140 million in stock.*

*Desmond is a writer and editor in Framingham, Mass., who serves as editor of eSecurityPlanet.com. He can be reached at paul@pdedit.com.*

## Intrusion detection and prevention

An anomaly-based IDS can detect attacks by analyzing traffic and looking for suspicious activity.



not just detect an attack, but prevent one.

He's watched the device stop various intrusion attempts and packet floods. "There was a Trojan worm that was supposed to distribute itself, but it was stopped at the [NetProtect] box," he says, noting the same worm got by an antivirus system and firewall on a different network segment.

NetProtect also is simpler to maintain than the three previous brands of firewalls with which Meroz has worked, all from leading vendors. Users attach the device to the network segment they want to protect, then put the box in "learning" mode for a couple of hours. NetProtect detects what network protocols and services are running and assesses what constitutes normal behavior. The device then can be switched to transparent mode, in which it will show the types of attacks that are taking place and the steps it would take to block them. In active mode, the device actually blocks attacks, by dropping packets or resetting connections.

When it does block traffic, it does so only from a specific IP address and only for a few seconds or minutes, depending on the severity of the attack, Meroz says. Once it lifts the block, it continues to monitor that address. "That's a very important feature for us because many of our clients are sitting behind one legal IP address and many attacks use IP address spoofing," he says. So when an attacker is using a legitimate user's IP address, traffic is only disrupted

after which it learns about its network surroundings and creates a baseline for traffic patterns at various times of day and in different network segments. IntruVert also pushes out signature updates to customers, and provides for an automated update.

That was a big step up for DaSilva from the signature-based IDS the university had. Signatures must be manually downloaded from the vendor and installed on the sensor. But his bigger gripe was that updates were issued only every two or three months. "It's not nearly frequent enough," to keep up with new attacks, he says.

When the Code Red worm hit, DaSilva's group had to write its own signature. The resulting code required the IDS to peer so deep into packets that it was affecting throughput. IntruShield, by contrast, is optimized for speed, he says, and can examine every packet in depth without affecting performance.

DaSilva also likes the reporting capabilities built in to IntruShield, noting that many other IDSs require a separate reporting package. "IntruVert gives you lots of management-type reports, top 10 attackers and such," he says.

That makes it simple to determine what new rules have to be written to thwart attacks, without having to monitor the device all day. "That can be quite time-consuming," he says. "If you have a lot of these deployed, it's a full-time job."

IntruVert also allows for distributed



# Special Report

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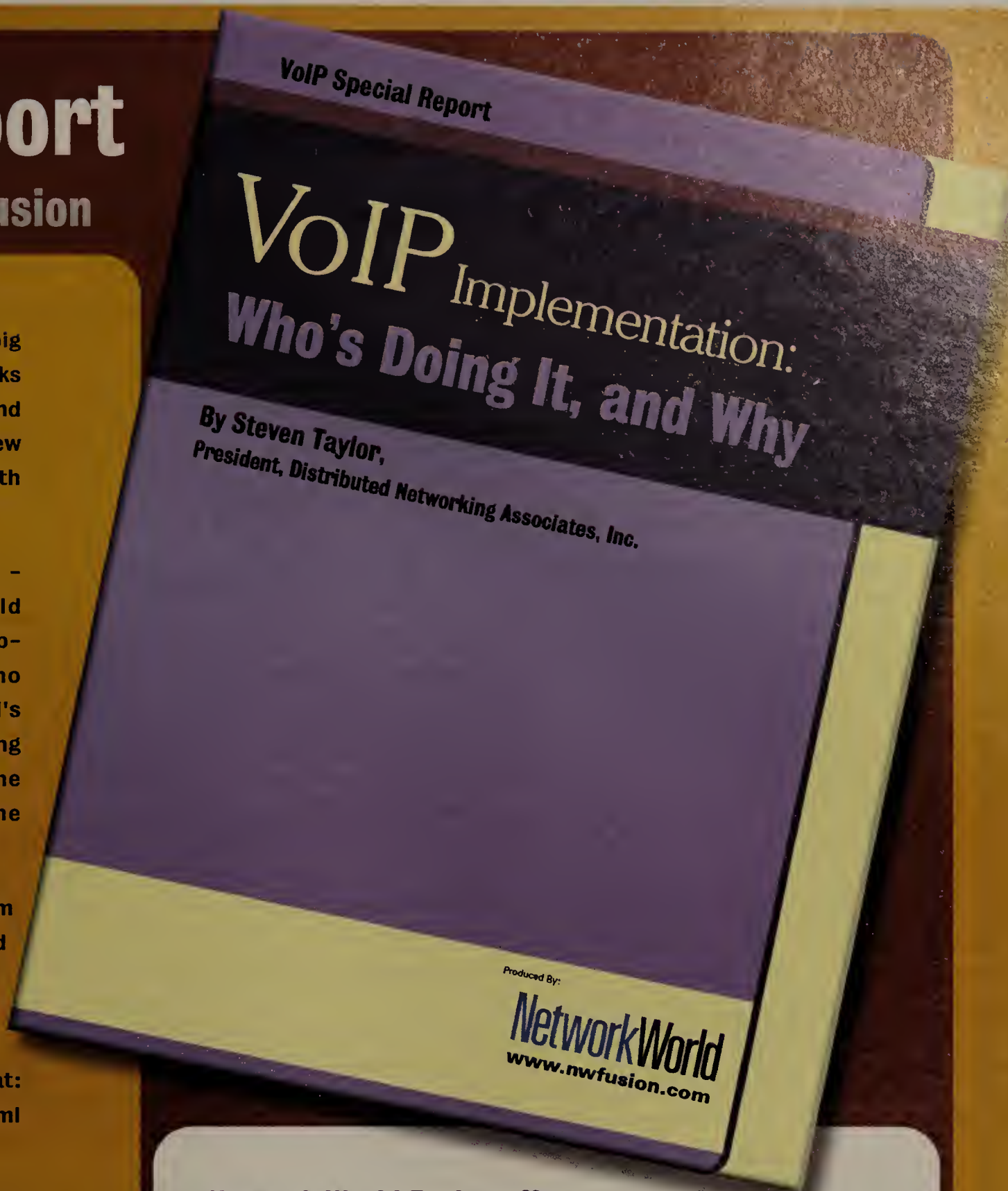
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Steve Taylor is president of Distributed Networking Associates and publisher of Webtorials.com, a Web site dedicated exclusively to technology tutorials in the broadband packet areas of frame relay, ATM and IP. Taylor also is a columnist for Network World and co-author of Network World's "Wide Area Networking" and "Convergence" newsletters. Taylor can be reached at [taylor@webtorials.com](mailto:taylor@webtorials.com).



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# NetworkWorld Review

# Blue Coat Security Gateway 800

## Combining caching with Web security

■ BY DAVID NEWMAN, NETWORK WORLD GLOBAL TEST ALLIANCE

**L**ast month CacheFlow changed its name to Blue Coat Systems, reflecting a new focus on policing the Web. The company's new beat cop is its Security Gateway 800, which combines proxy caching with fine-grained control over Web, Secure Sockets Layer and streaming media traffic. The SG800 handles security tasks that firewalls can't, such as blocking executable objects, viruses and other undesirable content on a per-object basis.

The new product also enhances CacheFlow's respectable caching performance. In our tests, the device moved traffic at rates of 1,200 transaction/sec, with no performance hit when advanced features are enabled. This performance and its ease of use made it worthy of our World Class Award.

Housed in a 1U (1.75-inch) rack-mountable enclosure, the SG800 we tested features 2G bytes of RAM, four redundant 68G-byte SCSI drives, two 10/100M bit/sec Ethernet interfaces and a copper gigabit Ethernet interface.

Setting up the SG800 is simply a matter of entering four parameters on a front-panel LED. Everything afterward can be done via CacheFlow's well-known intuitive Web interface.

The SG800 retains the same caching features as previous versions of the vendor's custom CacheOS operating system. Chief among these is "prefetching" of objects. If users often visit a site where pages contain a large number of images or other embedded objects, the cache will "prefetch" all objects so they can be served from the cache.

The user interface now includes a Visual Policy Manager (VPM), a Java-based applet with a look and feel that will be familiar to users of Check Point Software or NetScreen Technologies firewalls.

Where VPM differs from most firewalls is in its much finer grained control over access to Web, SSL and streaming media content. The SG800 lets users screen content based on HTML content type, executable content type, user's browser type,



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Check out the full performance results from our tests.

**DocFinder: 2130**

time of day and hundreds of other parameters. It's possible to block clients using Microsoft Internet Explorer 5.0 from requesting a group of URLs containing ActiveX objects during business hours.

VPM is equally strong when it comes to access policies. Users or groups can be allowed or denied access based on individual IP addresses, subnets, NT LAN Manager, Remote Authentication Dial-In User Service or Lightweight Directory Access Protocol authentication.

The SG800 can scan for viruses and objectionable content through use of third-party plug-ins. With these plug-ins, the SG800 will set up rules to deny content that contains known viruses or content such as violence, nudity, hate speech or other user-defined policies.

### Security concerns

As powerful as these security features can be, we are concerned with the product's remote management. While the SG800 supports encrypted access via SSL or Secure Shell (SSH), neither of these services is enabled by default. Instead, the default access is via a Web browser or telnet. As a result, an unauthorized user could intercept passwords or management commands.

Similarly, the SG800 can upload its logs to another server, but the transfer method is FTP, yet another insecure protocol.

Insecure default configurations are problematic in any device, let alone one called a "security gateway." Users are well advised to enable SSH and SSL before putting the SG800 into production networks.

### Speed demon

We ran several benchmarks to evaluate the SG800's performance (see How we did it, page 62). We measured basic transaction rate and transaction rates with logging and rule sets enabled.

To get a sense of how the SG800 would handle a meaningful production load, we used Web Polygraph, the open source tool that has become a de facto standard for measuring cache performance.

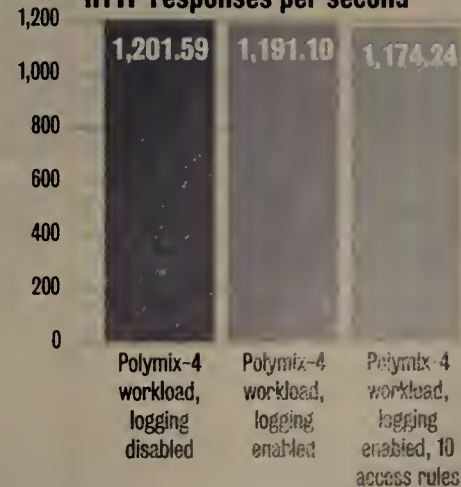
Polygraph's Polymix-4 traffic load uses a blend of content types, object size distributions, object popularity, object freshness and cacheability. Polygraph also models delays and packet loss typically added by WAN links.

The SG800 handled a peak load of

### Blue Coat SG800 response rates

In our tests, the device moved traffic at rates of 1,200 transactions per second, with no performance hit when advanced features, such as logging, were enabled.

#### HTTP responses per second



Rates based on four-hour peak duration, 52G-byte working set.

## Net Results

### Security Gateway 800

**4.6**  
RATING

**Company:** Blue Coat Systems, (408) 220-2200, www.bluecoat.com **Cost:** \$6,000 to \$30,000 (as tested).  
**Pros:** Fine-grained access control; a snap to use; strong performer.  
**Cons:** Encryption of administrative traffic disabled by default.

### What's the score?

#### Security Gateway 800

|                    |            |
|--------------------|------------|
| Features 30%       | 5          |
| Performance 30%    | 5          |
| Ease of use 20%    | 5          |
| Security 10%       | 2          |
| Price/value 10%    | 4          |
| <b>TOTAL SCORE</b> | <b>4.6</b> |



**Individual category scores** are based on a scale of 1 to 5. **Percentages** are the weight given each category in determining the total score. **■ Scoring Key:** 5: Exceptional showing in this category. Defines the standard of excellence. 4: Very good showing. Although there may be room for improvement, this product was much better than the average. 3: Average showing in this category. Product was neither especially good nor exceptionally bad. 2: Below average. Lacked some features or lower performance than other products or than expected. 1: Consistently subpar, or lacking features being reviewed.



1,202 transaction/sec in our tests, and it's possible that the device could go even faster. The 1,202-transaction/sec rate represents a horsepower limit of our test bed, and not necessarily a limit of the SG800.

We conducted our initial tests with access logging disabled. Because access logging is commonly used in production

settings, we ran the test once again with logging enabled.

The good news is that transaction rates were just about the same: Even with logging turned on, the SG800 moved 1,191 transaction/sec.

We ran the same test with 10 access policies defined — five "allow" rules and

five "denies" — the SG800 moved around 1,174 transaction/sec.

One cost to adding logging and access rules was that the number of errors increased.

In our baseline test, there were virtually no errors. With logging enabled, there were errors on about 3.5% of transac-

tions, and there were errors on about 7% of transactions with logging and access rules enabled.

Most errors involved transaction timeouts, but in all cases overall response times remained fairly even.

The SG800 offers a unique combination with its fine-grained access control and its caching features that help network professionals save bandwidth and speed response times.

*Newman is president of Network Test in Westlake Village, Calif., an independent benchmarking consultancy. He can be reached at [dnewman@networktest.com](mailto:dnewman@networktest.com).*



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For more details:

## How we did it

To measure cache performance, we used Web Polygraph, an open source HTTP generation and analysis tool. Besides the Blue Coat Security Gateway, our test bed included three pairs of Dell Optiplex GX100 machines with 256M bytes of RAM running FreeBSD 4.3 and Web Polygraph and an Extreme Networks Summit 7i switch that tied all the systems together.

We used the Polymix-4 workload and Release 2.7.6 of the Polygraph software. We used the default parameters of 10 phases, including two peak load phases during which we took our measurements. We also enabled FreeBSD's Dummynet feature, which simulates client-side WAN latencies of 40 msec per packet and a 0.05% probability of packet loss on the server side. We did not add latency or packet loss for the clients.

## Global Test Alliance

Newman is a member of the Network World Global Test Alliance, a cooperative of the premier reviewers in the network industry, each bringing to bear years of practical experience on every review. For more Test Alliance information, including what it takes to become a member, go to [www.nwfusion.com/alliance](http://www.nwfusion.com/alliance).

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Management

# Strategies

■ CAREER DEVELOPMENT  
■ PROJECT MANAGEMENT  
■ BUSINESS JUSTIFICATION

## Storage specialists

Two IT executives share why they pursued storage-area certification programs.

■ BY LINDA LEUNG

As 21st Century Insurance built its client base, its storage-area network soon ballooned to 15 terabytes of data. The Woodland Hills, Calif., company had little storage expertise in-house and relied on its main storage vendor, EMC, for guidance. But two years ago, the company put its network engineer in charge of the day-to-day running of the burgeoning SAN and sent him to train in the technology.

Thanks to Thomas Locke's storage education and certifications, he reclaimed about 1.5 terabytes of misallocated storage within the first six months of managing the SAN and has played an active role in the company's SAN redesign. Locke's certifications from EMC and the Storage Networking Industry Association (SNIA) also have earned him a promotion to network specialist.

"We wanted to educate ourselves so the company would not be so vendor-reliant for information and management," Locke says. Storage vendors have touted the management benefits of their products for years, and IT executives want to cut through the hype and understand how the technology could help their organizations. Storage certification could be the answer.

"There is a significant number of people starting to understand that storage is moving from direct-attached to SAN. But direct-attached still controls 80% of the market because there is not a lot of knowledge about SAN," says Steve Kenniston, technology analyst at Enterprise Storage Group.

Ray Dickensheets wanted to educate himself as a buyer. A senior technical analyst for Sprint, Dickensheets says his SNIA certification "has enhanced my knowledge of storage technologies. It brings a higher level of credibility and confidence in the technologies I recommend."

Sprint has used SANs since 1999 for Web hosting and has been expanding the infrastructure since it began managing larger file systems and databases for customers. Hitachi storage arrays, Qlogic SAN switches and several brands of host bus adapters comprise the SAN.

The company has been planning a migration from 1-gigabit SAN technology to the newer standard-compliant 2-gigabit archi-

ture. Dickensheets says the knowledge he gained from his storage education has been essential in evaluating the new technology.

For Locke, storage education helped him rein in 21st Century's unwieldy SAN. Three years ago, the firm started with an EMC-designed environment that stored 10 terabytes of data, and added more host

servers to support new applications. But 21st Century had little knowledge of how the extra data could be installed efficiently to save disk space.

By the end of the first year of installation, 21st Century was operating three EMC Symmetrix disk arrays. The infrastructure included five isolated storage network fabrics running different Fibre Channel protocols. Some storage was connected to only one fabric, thus stranding valuable space.

Locke's first task upon taking responsibility for the SAN was to document the entire architecture and attend training.

Last year, the company decided to redesign its SAN. Through Locke's understanding of efficient SAN designs, 21st Century now is consolidating its storage to fit two EMC disk arrays instead of three, plus implementing a fabric design that taps high-availability features.

Scheduled for completion in October, the redesigned SAN will provide redundant paths for critical production data. Any host on the SAN can be assigned to any storage, and all host bus adapters will use the Fibre Channel protocol.

### Study specifics

The SNIA program appealed to Dickensheets because it is vendor-neutral. He already holds the Professional and Practitioner designations and is preparing for the Specialist exam.

Dickensheets set aside several weeks of intense studying for the tests — one test for each certification — by reading various books about the technology. He wants to take some instructor-led courses for his next exam because of the need for hands-on experience.

Locke, who already holds Microsoft Certified Systems Engineer and MCSE NT 4.0 certifications, first turned to EMC for education, taking some of its instructor-led courses and reading books.

After two months of studying and practicing with some storage switches at work, Locke passed the exams and gained the designation EMC Proven Professional: Operator at the Associate level. He has two more tests to take for the higher Operator at Master level certification.

After gaining his first EMC certification Locke decided to study for the SNIA FC-SAN: Professional exam. Like Dickensheets, he prepared for the test on his own, but recommends taking instructor-led courses.

"The SNIA exam was pretty tough, even though it was a Level 1 test — it was pretty technical," Locke says. "I would put the EMC and SNIA exams on a par. It is difficult to read books and pass without hands-on training."

He is now preparing for the SNIA FC-SAN: Practitioner level exam and says he hopes to take some classes when his schedule allows.

Locke plans to continue with storage education and says it makes him more marketable. "I've always been engaged in a very Microsoft-centric world and now that storage crosses all platforms, my technical ability has crossed to Unix and mainframes. It gives me a rounder view of the industry," he says. ■

### Storage smarts

Here's a sampling of available storage certification programs to consider.

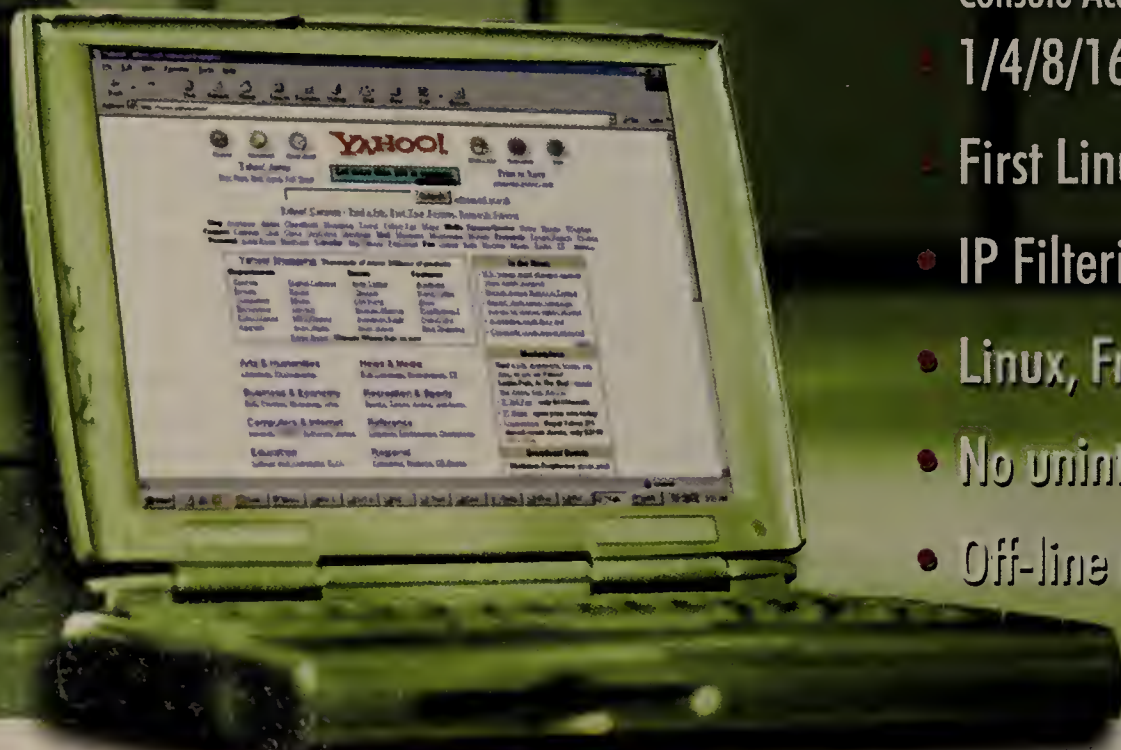
|  |   |
|--|---|
| <b>Adaptec</b>                                 | Adaptec Certified Storage Professionals possess in-depth knowledge of Adaptec products, server I/O technologies, RAID theory and implementation, and troubleshooting methods.   |
| <b>Brocade</b>                                 | The Brocade Certified Fabric Professional validates those who can install, configure and troubleshoot various Brocade products, while Certified SAN Designers have a detailed understanding of SAN design and implementation.   |
| <b>EMC</b>                                     | The EMC Proven Professional Certification Program offers four designations — EMC Proven Professional Operator, Builder, Architect and Instructor. Each track also provides an Associate level and Master level.   |
| <b>McData</b>                                  | The McData Certified Professional designation has two tracks: Storage Network Designer and the soon-to-be launched Storage Network Implementer. Certification holders can design small to midsize storage networks, incorporating any or all of McData's products. Higher-level certifications are on the way.                      |
| <b>Sun (created with Veritas)</b>              | Sun Certified Data Management Engineers can administer disk array storage systems, while Sun Certified Backup and Recovery Engineers are knowledgeable about reliable back-up methodology, data restoration and design requirements. Sun Certified Storage Architects specialize in SAN design, implementation and troubleshooting. |
| <b>Storage Networking Industry Association</b> | Created by Infinity I/O, the program offers Fibre Channel Storage Area Network certifications in three levels: Professional, Practitioner and Specialist. The first level is aimed at help desk and support pros, the midlevel is for those who already work with Fibre Channel and SANs, and the top tier is aimed at engineers.   |



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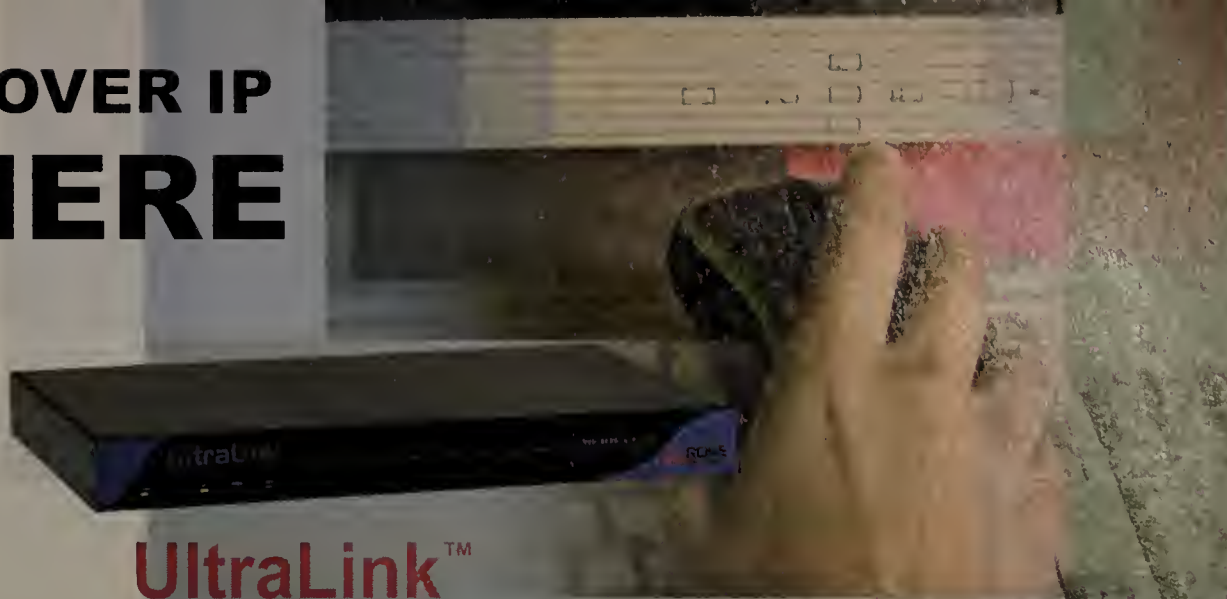
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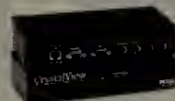
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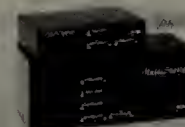
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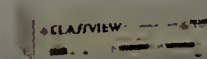
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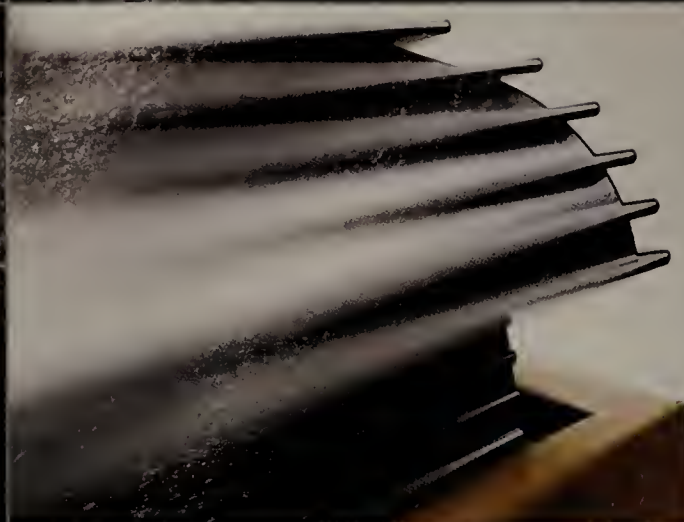
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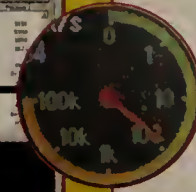
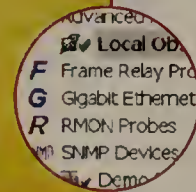
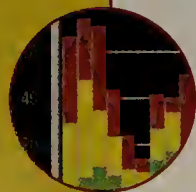
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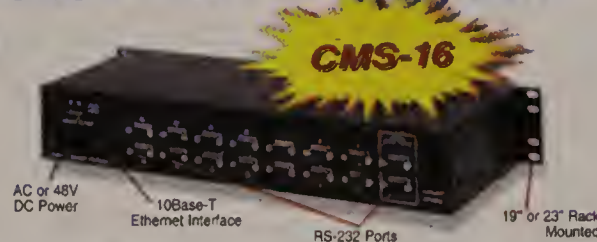
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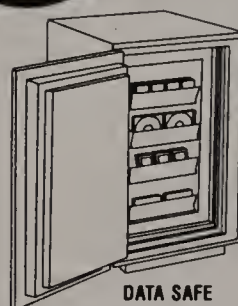
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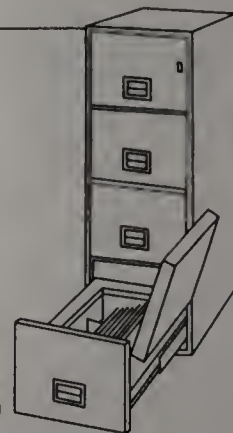
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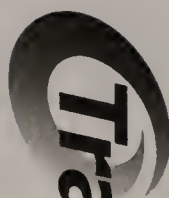


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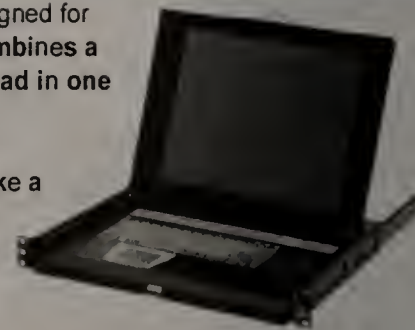
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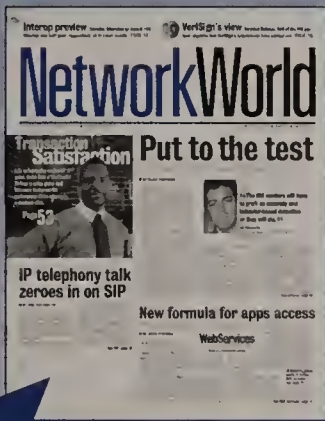
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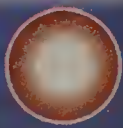
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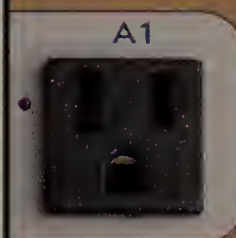


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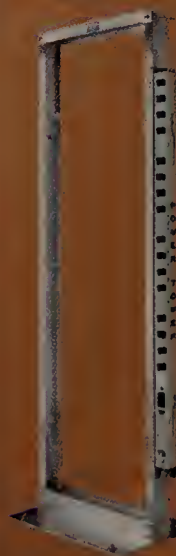
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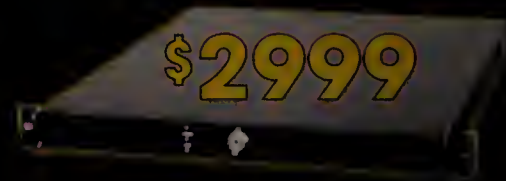
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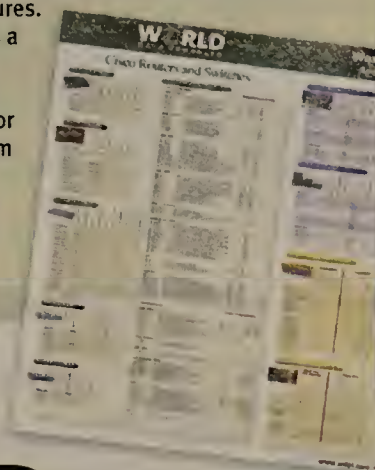
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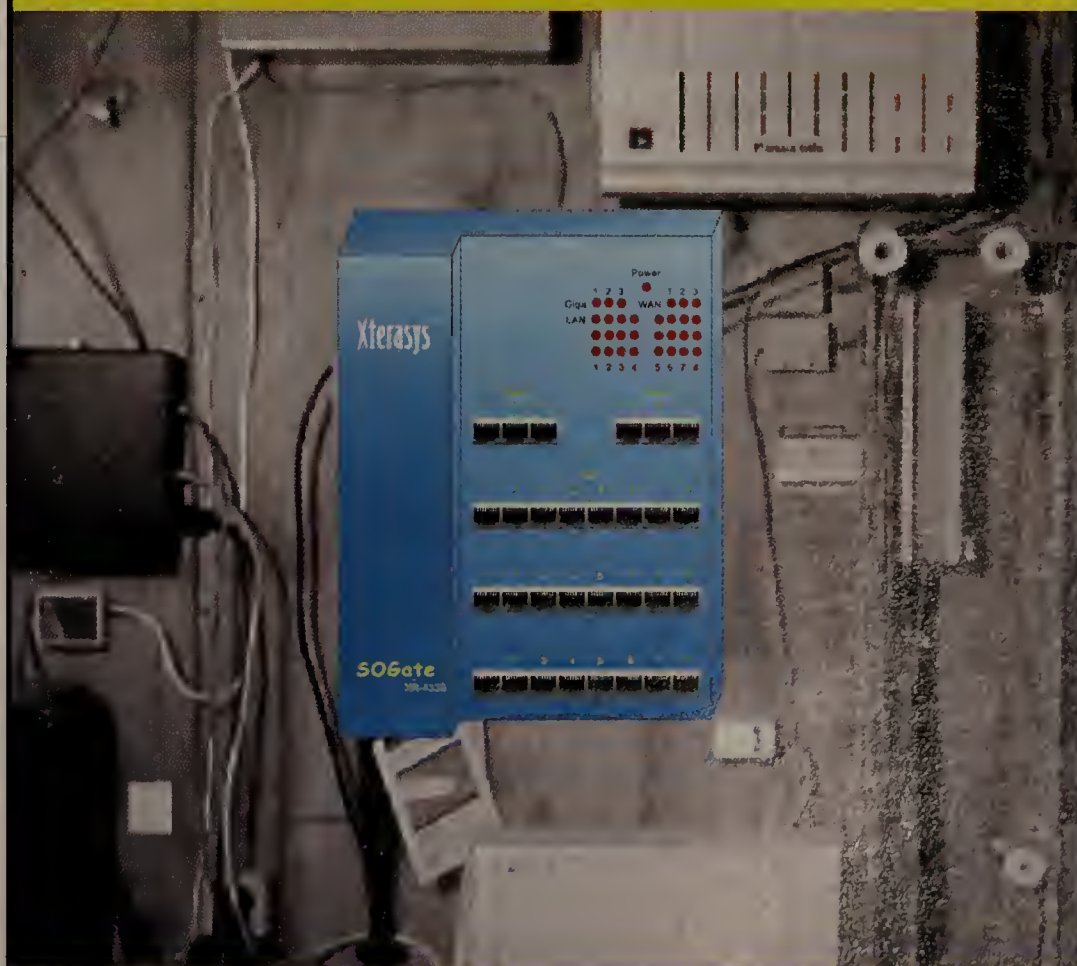
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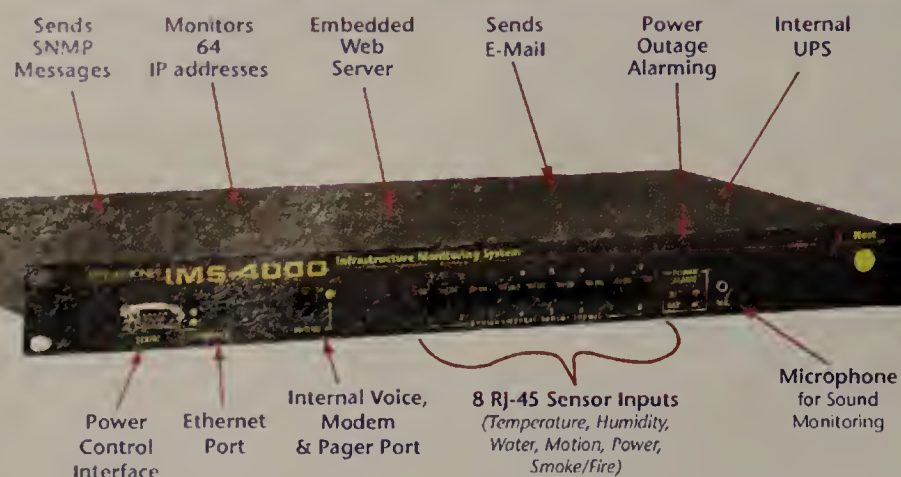
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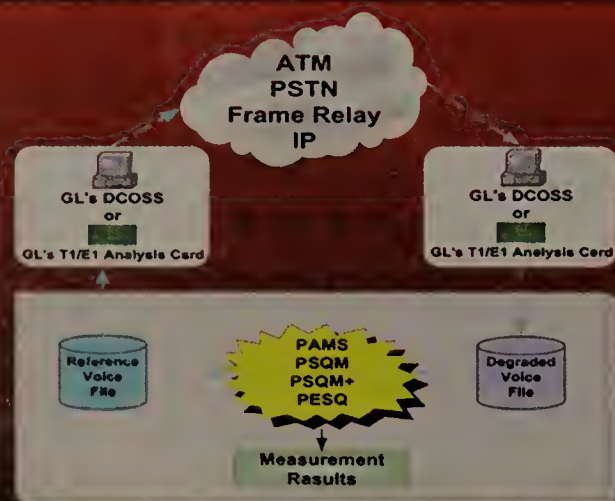
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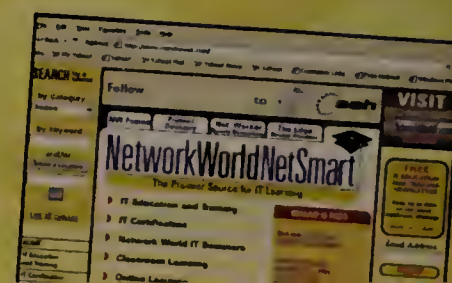


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Jane Weissman, Sales Operations Coordinator  
Internet: clasker, jweissman@nww.com  
(508) 460-3333/FAX: (508) 460-1237

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# DSL providers expand service options

■ BY MICHAEL MARTIN

DSL companies, like their cable counterparts, are beginning to introduce a variety of service plans and pricing options, giving companies with telecommuters a choice of paying more money for a high-end service, or less for a basic broadband offering that's still better than dial-up.

Until recently, DSL providers didn't offer many broadband options, says Matthew Davis, an analyst with The Yankee Group.

"The technology wasn't really there to allow them to differentiate, but it is now," he says.

Many DSL providers offered speed variations, but the speed was controlled at the DSL access multiplexer, and there were no solid service-level agreements or quality guarantees.

But now, service providers are putting software systems in place that let them ensure different levels of service and speed for different DSL offerings, Davis says.

One company making systems that let providers offer different

## SBC introduces tiered DSL services

Once fully implemented, the service speeds will include:

| DSL product                   | Speed: download/<br>upload kilobit/sec | Recommended uses   |
|-------------------------------|--|--|
| DSL Basic Package             | Up to 384 by 128                       | Web surfing, e-mail, online research                                     |
| DSL Standard Plus Package     | 384 to 1,500 by 128                    | Streaming audio/video, home network                                      |
| DSL Deluxe Package            | 768 to 1,500 by 256                    | Telecommuting, videoconferencing   |
| DSL Standard Plus — S Package | 384 to 1,500 by 128                    | VPN access, hosting Web/e-mail server, business-to-business commerce     |
| DSL Expert Plus — S Package   | 1500 to 6,000 by 384                   | Uploading large documents to shared server, high-grade videoconferencing |

DSL flavors is Spirent Communications. Spirent, which makes a range of DSL testing and management software, has a client list that includes regional Bell operating companies SBC Communications and Verizon.

SBC is the latest provider to unveil tiered service and pricing.

In late August, SBC announced it would roll out six DSL packages this fall. The packages range from a basic service that offers down-

load speeds of up to 384K bit/sec and upload speeds of up to 128K bit/sec with a dynamic IP address, to a high-end offering with download speeds ranging from 1.5M to 6M bit/sec, upload speeds of up to 384K bit/sec and five static IP addresses.

The main goal of most DSL and cable providers offering tiered services is to attract customers who aren't willing to pay the current cost of a standard broad-

band service, says Pat Hurley, an analyst with TeleChoice.

Service tiers let providers offer basic packages for less than \$50 per month, which is the standard rate for most DSL and cable plans.

But the tiers also let companies wanting better service for key telecommuters pay more for better service guarantees.

One pricing tier drawback is that companies and consumers that are used to paying a standard one-size-fits-all fee for a heavily used connection might end up having to pay more, or settle for a lower-quality service.

"Consumers are going to have to get used to the idea of paying for more when it comes to broadband," Davis says.

At the same time, if the RBOCs want to attract higher-end business users and power telecommuters, they'll have to offer service guarantees, Hurley says. ■

## Interop

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fixes to every machine, and creates detailed assessment and remediation reports. The tool also provides users with real-time access to Microsoft's patch database.

Also on the server front, start-up SaberFile will debut its SaberFile-HQ, an appliance that controls access to files stored on a corporate network on any platform. The gateway consolidates administration of file access rights using its Policy Manager feature and integrates with corporate directories to handle authentication of users. The gateway can be installed behind a firewall or used to provide access to company files for external users.

## Beyond security

N+I has seen better days in terms of vendor and attendee turnout, but issues such as convergence and upgrading network infrastructures for the future have not disappeared, says Bobby Johnson, CEO of Foundry, who is giving a keynote at the show.

"I think given the economy, many enterprises have put a little bit of a cap you could say on some deployment plans," Johnson says. "But as people start looking to replace old FDDI and ATM networks, they'll look to next-generation Ethernet-based solutions. They certainly don't want the network to be a bottleneck down the road."

Also at N+I:

• Coyote Point Systems will announce its Equalizer 7.0, a Layer 7-enabled upgrade for the



“Wireless networks can be just as secure as their wired counterparts.”

Craig Mathias  
Principal, Farpoint Group

company's E-350 and E-450 load-balancing appliances. The Layer 7 capabilities include cookie-based persistence, HTTP-based load balancing and security with Secure Sockets Layer identification-based persistence.

• Celestix Networks' FV930 VPN appliance will be introduced at the show with preinstalled Check Point Software VPN-1, Firewall-1 and FloodGate-1 software. It is targeted at midsize networks and can provide up to 189M bit/sec of firewall throughput.

• Network interface card (NIC) vendor Sysconnect will jump on the security bandwagon with announcements that its Gigabit Ethernet fiber- and copper-based adapters will be used in security products such as Network Associates' Sniffer and Internet Security Systems' RealSecure Gigabit Network Sensor security appliance. The company also will announce its single-chip NIC, which it says will cost around half the price of its previous high-end Gigabit Ethernet adapters.

Senior Editor John Fontana contributed to this story.

# Cisco: VPNs vulnerable

■ BY IDG NEWS SERVICE

SAN JOSE — Cisco last week warned of vulnerabilities in some of its VPN products that could make it easier for hackers to get into secured networks or carry out denial-of-service attacks.

Cisco issued an advisory (www.nwfusion.com, DocFinder: 2158) detailing 13 vulnerabilities that could affect its VPN 3000 series concentrators. Those devices are designed to provide secure remote access to enterprise resources over public networks.



Cisco VPN 3000 concentrators are vulnerable to attacks, but patches are available.

The potential problems were uncovered by customers and through internal development testing. Cisco is not aware of any malicious use or public announcement of the vulnerabilities, according to the advisory.

The advisory contains links to software patches on Cisco's Web site. ■



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SPS-100



## IETF

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how you're going to deal with heterogeneous receivers," says Allison Mankin, a director of the IETF's Transport Area who oversaw development of this framework. "This approach has a lot of promise."

The IETF's new framework targets a real-world problem for corporations, says Lucinda Borovick, director of data center networks with IDC.

"You have your data center and distributed sites, and you need to find a way to get large files and applications from headquarters to remote locations," Borovick says. "Most IT managers just increase their network bandwidth, and hopefully that's not too cost-prohibitive. But the files are getting so big that increasing bandwidth doesn't work."

Borovick says IT managers can use data compression or bandwidth-management techniques to address this problem. However, she is optimistic about the multicast approach taken in products from Digital Fountain and its reseller, Cisco.

"There's a clear need for this technology," Borovick says.

### Digital Fountain is the leader

Digital Fountain, a leader in developing products to support the IETF's Reliable Multicast Transport framework, has several customers, including Seibel and PeopleSoft. These companies use Digital Fountain's specialized servers to ensure timely and predictable delivery of software builds to development teams in Europe, Asia and South America.

PeopleSoft sends between 60 and 70 software builds per week to its 14 offices worldwide, and those files range in size from 50M to 400M bytes, says Graham Begg, manager of environment global operations. These files are sent over the company's private frame relay network, which has connections ranging from 256K to 2M bit/sec.

PeopleSoft wanted an automatic system for sending these files in the most efficient way over low-bandwidth connections. More important than speeding up the delivery time for these files was guaranteed delivery within a specified time frame regardless of the network going down or being congested.

"It's the reliability and the predictability that we were looking for," Begg says. "We need to know that on a particular day at 9 a.m. local time the file will be available."

So PeopleSoft purchased Digital Fountain's Transporter Fountain, which has operated in production mode for four months. So far, the Transporter Fountain has successfully delivered all of PeopleSoft's files within one hour and 45 minutes as programmed.

Begg says the Transporter Fountain cost

about \$50,000 and required no more than 20 manhours to set up.

"The return on investment will come when we experience some catastrophic event on the network that would have prevented a file [from] getting where it needs to go," Begg says. "The ROI comes when we don't lose development time."

Begg set up the Transporter Fountain in unicast or point-to-point mode, but plans to migrate to multicast mode soon.

"That will further reduce our hit on the network and improve our WAN performance," Begg says. "That's when we'll get the real benefit."

### Luby's encoding technique

In addition to supporting the IETF's Reliable Multicast Transport work, Digital Fountain's servers also boast a patented mathematical encoding technology developed by the company's co-founder

on the Reliable Multicast Transport framework.

"Digital Fountain is really the creator of this class of multicast applications," Mankin says. "Luby has created a very successful piece of mathematics that's proprietary to Digital Fountain. . . . But he's also done well with the protocol work."

Luby and Digital Fountain have been involved in the IETF's Reliable Multicast Transport work from the beginning.

The focus of the IETF's Reliable Multicast Transport working group was to prevent congestion problems from the use of multicast communications for large file distribution. Multicast employs the User Datagram Protocol (UDP) running on IP, rather than the more common TCP running on IP. Unlike TCP, UDP does not have built-in congestion control.

"You can't really do multicast with TCP because [multicast requires] two peers

Jim Gemmell, a Microsoft researcher and co-author of the two documents, has tested these protocols to distribute a 600M-byte Windows 2000 software build to Microsoft's developers.

"Every night, we put out the latest software build, and hundreds of developers need it the next morning. It loads up our network," Gemmell explains. "I can [distribute the build] off my notebook computer using a one-half-megabit multicast stream and satisfy everybody quicker than if they all pounded on our servers."

Other applications Gemmell has tried include distribution of PowerPoint presentations and software fixes.

"The first time there was an Internet Explorer upgrade, we wiped out Washington state's Internet infrastructure with the demand," Gemmell says. "We could pretty easily use multicast, and it would scale easier and use fewer network resources."

### What's next?

Next, the Reliable Multicast Transport working group plans to develop protocols that will support the distribution of large data files that are created on the fly, such as live video feeds and stock quotes, vs. the static files that the group's first two documents handled.

The initial working group documents might be a shot in the arm for multicast, which has yet to gain popularity despite built-in support in most routers and network hardware. Originally designed for streaming video, multicast has few carriers that support it and there is little use within enterprise networks. Distribution of large files might be the "killer" application for multicast, observers say.

"What's going to push multicast for this application is the size of the content and how fast it's increasing and how pervasive the problem is," Borovick says. "The pain is going to have to be greater than the cost for enterprises to adopt this approach."

Gemmell says the multicast approach to large-file distribution will save companies money on bandwidth and server capacity.

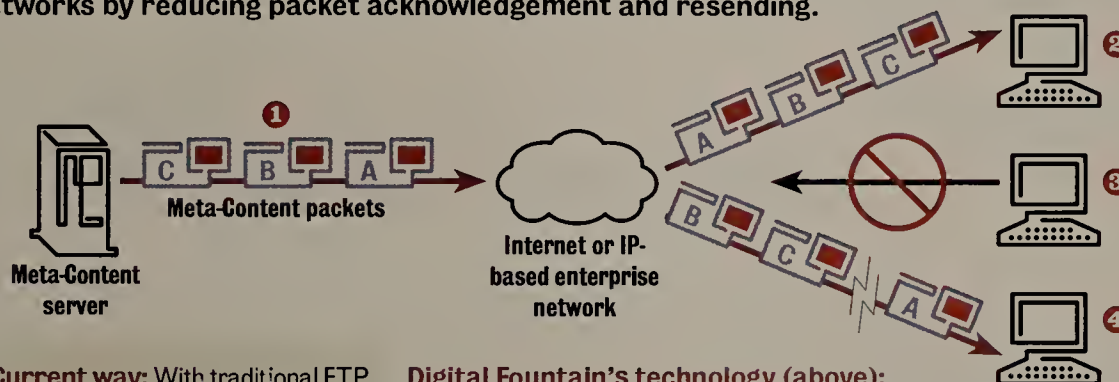
"The beauty of it is that it lets somebody become a source of data to a huge community without having to scale up to a massive server," Gemmell says. "Any group without even a fast link or a big server could support tons of users."

Gemmell says the multicast approach is ideal for companies that use satellite communications for data transfer because it requires no acknowledgements coming back from the receivers as the message is sent. Another good application, he says, would be for large data centers that regularly repurpose servers.

"If you have to blast a disk image out that's 80 gigabytes to multiple machines, if you don't multicast, you're in big trouble," he says. ■

## Special delivery

**Start-up Digital Fountain has developed an encoding technique that can be used in conjunction with a new IETF framework to speed distribution of large files over IP networks by reducing packet acknowledgement and resending.**



**Current way:** With traditional FTP, each packet has to be received in order and acknowledged. If a packet is lost or no acknowledgement is received, the packet is resent. If the connection is lost, all packets have to be resent.

### Digital Fountain's technology (above):

(1) A 1G-byte file is broken into Meta-Content packets, each of which contains mathematically encoded information describing the entire original file. (2) The packets can arrive in any order, (3) do not require acknowledgement and (4) won't be disrupted by lost connections because the sender simply keeps sending Meta-Content packets until enough arrive to re-create the original file.

and CTO, Michael Luby. This encoding technique breaks up large data files for delivery across a network.

In traditional data delivery, a large file is chopped up into small pieces and sent over a WAN with an acknowledgement of delivery sent back for each piece. All the pieces have to get to their destination in the right order for the data to be delivered. If the transmission is interrupted, the whole process starts over.

Luby's algorithm turns data into a series of equation-like packets called Meta-Content. Each packet has mathematically encoded information about the entire original file. So it doesn't matter which Meta-Content packets arrive or in what order, as long as enough of them are received. What constitutes "enough" varies by application. If the network connection is interrupted, the transmission of the Meta-Content packets will start from where it left off.

"Meta-Content packets are like little soldiers," Luby explains. "It doesn't matter which ones get through as long as enough get through."

Luby's innovation gets high marks from IETF officials who have worked with him

talking to each other," Mankin explains. "You have to find a way to do congestion control with something other than TCP. The job of the Reliable Multicast Transport working group was to find acceptable congestion control for these applications."

### IETF seeks requests for comments

The IETF on Aug. 27 approved the first two documents from the Reliable Multicast Transport working group as experimental requests for comments — an interim phase before full standardization.

The documents together make up a flexible framework for the distribution of large, static files across the Internet. The Layered Coding Transport (LCT) document describes how the sender can split a large file over multiple multicast channels to speed up delivery and avoid network congestion. The Asynchronous Layered Coding document describes how to use any forward error-correction encoding technique — such as Luby's Meta-Content packets — over the LCT protocol. Luby and engineers from Cisco and Microsoft co-authored these documents.



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## BackSpin Mark Gibbs



# Systems for megalomaniacs

*"CRM projects are notoriously complex, often over budget and frequently disappointing. ... Research firm Gartner says that through 2006, more than 50% of all CRM implementations will be viewed as failures from a customer's point of view."*

— from a Network Work Fusion article (www.nwfusion.com, DocFinder: 2153)

During the past few months there have been many stories about companies that set out to create comprehensive CRM and enterprise resource planning (ERP) systems only to find out they couldn't be built.

Last year Highmark, a health insurer, sued KPMG Consulting for "tens of millions of dollars over what it says was the consultancy's failure to create a 'critical' electronic billing and accounts receivable system. Highmark said KPMG abandoned the two-year, \$15 million project [after running] over schedule by more than a year and attempted to charge the insurer an additional \$8 million to complete the first phase of the project" (see *ComputerWorld* article at DocFinder: 2154).

There could have been incompetence on either or both sides. But even if everyone involved — the corporation, the target users and the teams responsible for design, coding, implementation and configura-

tion — is in agreement about what the brass ring looks like and how to grab it, once the carousel is in motion, nabbing the ring becomes impossible.

That's because of the complexity involved. Humans, even with computers, can build only to a certain level of complexity, because there are real limits to our ability to extract information from data.

Complexity Theory is a branch of science that attempts to model systems that are, well, complex. Its central idea is that simple objects create elaborate and unexpected behavior through interaction (go to DocFinder: 2155 for more information).

Moreover, it suggests that "critically interacting components self-organize to form potentially evolving structures exhibiting a hierarchy of emergent system properties" (see "Insights from complex systems," DocFinder: 2156). That means that a system can do things you never imagined.

To sum all of that up: Put some stuff together that does anything more than just sit there and rust, and if it interacts you'll get more than you bargained for.

Is it any surprise then that these CRM and ERP projects, which verge on megalomania, frequently fail? But if some control freak executive gets it in his head that "We can build a total solution" and persuades others that this idea is the truth and the light, surprisingly many corporations just can't say no.

Dick Morley, the man who invented the floppy disk,

once said of factories, which are hugely complex systems: "You don't have a prayer in hell of ever understanding factories. You really don't have control. By striving to get control, you only make it worse." The same applies to CRM and ERP in spades.

Now to add to these grandiose corporate control fantasies we have a new one: grid computing.

According to my *Network World* colleague, fellow columnist Frank Dzubeck (DocFinder: 2157): "[A] grid is an amorphous IP network that links heterogeneous servers, storage devices, clients, appliances and software to form a transparent virtual resource that can be dynamically allocated, accessed and shared by users and applications."

Sounds sexy but let's get real. The complexity of such solutions, if they are to be enterprise scale, will lead to vast expense and huge management overhead, and a whole new universe of problems.

And imagine the problems that we'll have when CRM and ERP systems rely on grid infrastructures!

We, the high-tech culture, radically overestimate our ability to handle complexity and what we can build, and underestimate our ignorance of how systems really work.

As a wise sage once wrote, "Keep it simple, stupid."

*Thoughts, simple or complex, to backspin@gibbs.com.*

## 'NetBuzz News, insights, opinions and oddities



By Paul McNamara

### The good news one year later

We will hear often this week about how the attacks of Sept. 11 have fundamentally and irreversibly changed life in America.

True enough. But also true is that the worst fears of many have failed to materialize, particularly within the particular subset of U.S. society that is our industry.

Despite repeated dire warnings to the contrary, we stand a year after the worst assault on our country since Pearl Harbor, and terrorists have yet to disrupt the power grid, our telephone networks or the Internet. If they have attempted to harm major U.S. e-commerce operations through computer viruses, such efforts have been thwarted or crudely ineffective.

In short, there is good news to make note of in addition to all of this week's solemnity and remembrance. Which isn't to suggest that the absence of additional terrorist activity has or should have bred complacency.

A recent survey commissioned by AT&T shows that three out of four large companies now have a formal business-continuity/disaster-recovery plan, and that three-quarters of those companies have reviewed the adequacy of their plans since Sept. 11. More than half of those polled report that network and IT security have become more important issues within their companies since that most brutal of wake-up calls. ... Prudence reigns.

Yet in the immediate aftermath of Sept. 11, implicit in all of the calls for greater attention to disaster preparedness was the assumption that disasters of the manmade kind would inevitably become more common ... even commonplace.

As of this writing, at least, that assumption has proven unfounded, and for that we should take a moment to be thankful.

### Slingshot mortally wounded

Last November we wrote about a prepaid Internet access company called Slingshot — \$10 for a CD that'll give you 10 hours online — and the item carried this headline: "Who would have thought this was a market?"

Now we know the answer to that question: not enough customers.

Slingshot went belly up recently and reportedly left some 25,000 customers holding the bag for 16 million minutes of prepaid Internet service that they will be unable to use. A company executive told the *Seattle Post-Intelligencer* that Slingshot was trying to make arrangements for another service provider to do right by those customers, but that refunds would not be forthcoming.

As often happens in the wake of such news, competitors were stepping forward last week to volunteer their services to help fill the void created by Slingshot's demise. Buzz received pitches from two such companies — Pine Creek Systems and BAMnet. Pine Creek brags about having been around since 1997, and BAMnet's founder talked a good game when we profiled that company in the spring of 2001.

Needless to say, caveat emptor.

### Baseball needs fewer lawyers

Why are the people who run Major League Baseball so intent on driving baseball fans to choose another pastime?

The narrowly averted players' strike was difficult enough to tolerate, but now comes news that MLB has unleashed its lawyers on a handful of fans who care so passionately about their respective teams that they built Web sites for the like-minded among them. The alleged sins perpetrated by these site operators didn't amount to a hill of scuffled baseballs.

National Football League fans build their share of such Web sites, and the NFL's policy is to leave them be unless they become expressly commercial.

*Want to sling a shot my way? The address is buzz@nwv.com.*



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The DT-50 is a cost-effective solution that features Canon's most advanced Auto-Tracking System, 622 Mbps (ATM/OC-12) transmission speed, links of up to 2 kilometers, and FDDI and Fast Ethernet using interchangeable cards.

The DT-55 includes all features offered in the DT-50 but with even faster Gigabit Ethernet connectivity capabilities.

The DT-30 is a lower cost transceiver for applications with shorter link distances (up to 500m), where auto-tracking is not required. The DT-30 supports data rates of 10 to 156 Mbps.

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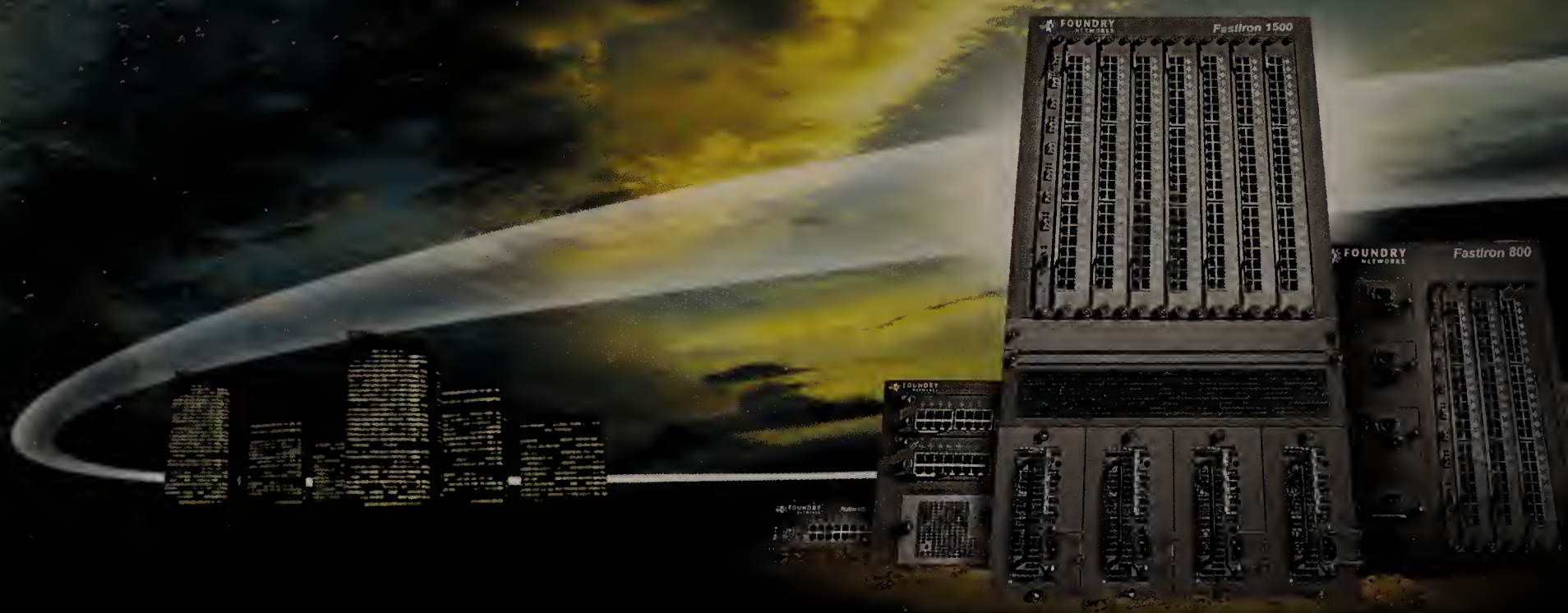
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1 What is the principal business activity at your location? (check ONE only)
01 Manufacturing (other)
02 Finance/Banking
03 Insurance/Real Estate/Legal
04 Health Care Services
05 Hospitality/Entertainment/Recreation
06 Media/TV/Cable/Radio/Print
07 Retail/Wholesale Trade/Business Services
08 Transportation
09 Utilities/Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
10 Government/Military
11 Consulting (Independent)\*
12 Education
13 Carriers/Voice/Data/ISP
14 Web Hosting/HSP
15 ASP/SSP/MSP
16 Manufacturing (Computer/Communications/OEM)
17 Resellers/VARS/VADs/Integrators/Distributors (Computers/Communications/\*)
18 Other
\*ATTN CONSULTANTS, INTEGRATORS, DISTRIBUTORS, RESELLERS: PLEASE COMPLETE FORM BASED ON ALL CLIENTS AND YOUR OWN BUSINESS NEEDS.

2 P: What is your primary job function? (check ONE only)
A: What additional job functions are you involved in? (check ALL that apply)
P A
1. Network Management
2. COO/CTO/CSO/IS/IT/MIS/Systems Management
3. LAN Management
4. Datacom/Telecom Management
5. Internet/Intranet/Web/E-Commerce Management
6. Engineering Management/Applications Management
7. Corporate Management (CEO, COO, CFO, Pres., VP, Dir., Mgr.)
8. Consultant (Independent)
9. Other

3 What is the estimated value of network equipment and services that you specify, recommend, or approve the purchase of for this location and for all other locations?
A. THIS LOCATION B. ALL OTHER LOCATIONS
(Please print the appropriate number code on the line next to each product category. Please complete ALL categories A-P.)
1. \$100 Million or More
2. \$50 Million to \$99.9 Million
3. \$25 Million to \$49.9 Million
4. \$10 Million to \$24.9 Million
5. \$1 Million to \$9.9 Million
6. \$100,000 to \$999,999
7. \$50,000 to \$99,999
8. Under \$50,000
9. None of the above
A B
A. Large Systems (Mainframes/Minis)
B. Desktops (Micros/Laptops/Workstations)
C. Mobile (Including PDAs, Wireless)
D. Servers
E. LANs
F. WAN Equipment
G. Carrier Services
H. Internet/Web/E-Commerce
I. Intranet/Extranet
J. Internetworking (Including Routers, Switches)
K. Storage
L. Remote Access
M. Peripherals (Including Printers)
N. Software
O. Services/Support Services
P. Security

4 What is the total number of sites for which you have purchase influence? (check ONE only)
1. 100+ 2. 50 to 99 3. 20 to 49 4. 10 to 19 5. 2 to 9 6. 1 7. None

5 What is the total number of Servers/Clients installed/planned at your location/in your entire organization? (check ONE box in each column)
At Location SERVERS Entire Org. At Location CLIENTS Entire Org.
A B C D
1. 50,000+
2. 10,000 to 49,999
3. 1,000 to 9,999
4. 100 to 999
5. 50 to 99
6. 10 to 49
7. 1 to 9
8. None

6 What is your scope and involvement in purchasing decisions for network products and services for your enterprise?
A. SCOPE (check ONE only) Corporate/Enterprise
1. Entire Enterprise/Multiple Enterprises
2. Multinational Enterprise
3. Division/Multiple Divisions
4. Department
5. None
B. INVOLVEMENT (check ALL that apply)
1. Create Network/IT Strategy
2. Create Short List
3. Recommend/Specify Brand
4. Authorize/Approve Purchase
5. Evaluate Products/Services
6. Determine the Need
7. None

To qualify: You must supply your name, title and company name/address/phone on the business reply panel below. Please print clearly.
My home is also my business address. Optional delivery address: Enter your home address below if your company will not accept delivery at your business address.

Street Address (Home)
City State Zip
Internet E-mail Address

If there is a parent company, please provide name
If military, please specify branch and base
If government, please specify division

7 What is the estimated number of employees in your entire organization/at your location? (check ONE in each section only)
A. ENTIRE ORGANIZATION B. AT YOUR LOCATION
1. Over 20,000 2. 10,000 to 19,999 3. 5,000 to 9,999 4. 2,500 to 4,999 5. 1,000 to 2,499
6. 500 to 999 7. 499 or Less
1. Over 20,000 2. 10,000 to 19,999 3. 5,000 to 9,999 4. 2,500 to 4,999 5. 1,000 to 2,499
6. 500 to 999 7. 250 to 499 8. 100 to 249 9. 99 or Less

8 Please indicate the Web/Security/LAN/Internetworking/Wireless/Mobile/WAN Equipment/Carrier Services that you are currently involved in purchasing or plan to purchase. (check ALL that apply)
A. CURRENTLY INVOLVED IN PURCHASING B. PLAN TO PURCHASE
WEB WIRELESS/MOBILE
01. Web Servers/Software
02. Web Traffic Management
03. Electronic Commerce Tools
04. Web Development Tools/Content Mgmt.
05. Web Collaboration/Groupware
06. Web Acceleration/Caching/Load Balancing
07. Web Hosting Services
08. Portal/Intranet
09. Other Web
40. Fixed Wireless LAN Equip/Services incl. 802.11
41. Wireless/Cell Phones
42. PDAs
43. Bluetooth
44. Mobile Data Equipment/ Services
45. Other Remote/Wireless
WAN EQUIPMENT
46. Frame Relay Equipment
47. Bandwidth Managers/Shaping/QOS Tools
48. Optical Networks/Switches
49. Voice/Video over IP Gateways
50. Modems/Cable Modems
51. xDSL Products
52. Diagnostic Test Equipment
53. DSUs/CSUs
54. PBXs
55. Public Network Equipment
56. Call Center Tools
57. Video Conferencing Gear
58. ISDN Equipment/Services
59. Other WAN Equipment/Services

SECURITY
10. Firewalls
11. Anti-Virus Software
12. Public Key Encryption (PKI)
13. DES Encryption Tools
14. Authentication Tools
15. Intrusion Detection
16. Biometrics
17. VPN Equipment
18. VPN Security
19. VPN Services
20. Other Security
LANs/INTERNETWORKING
21. Fast Ethernet
22. Gigabit Ethernet
23. Layer 3-7 Switches
24. ATM Switches
25. Routers
26. Network Attached Storage (NAS)
27. Storage Area Networks (SANs)
28. Storage Backup (Optical, Disk, Tape, RAID)
29. Disaster Recovery/Business Continuity
30. Storage Resource Management
31. Network Test/Diagnostic Tools/Analyzers
32. Uninterruptible Power Supplies (UPS)
33. Network Interface Cards (NICs, PCMCIA)
34. Hubs/Intelligent Hubs/Stackable Hubs
35. Cables, Connectors, Baluns
36. Wiring/Fiber Systems
37. Net Management Systems
38. Voice over IP (VoIP) Tools
39. Other LAN/Internetworking

CARRIER SERVICES
60. Internet Access Service/ISP
61. Private Lines
62. Frame Relay Services
63. ADSL/DSL
64. T-1/T-3 Services
65. ATM Services
66. Managed Services
67. LAN-Extension Services
68. OC-3/OC-12
69. Wavelength Services
70. Other Carrier Services
None of the above (1-70) 71.

9 Please indicate the Systems/Peripherals/Software/Applications/Business Services that you are currently involved in purchasing or plan to purchase. (check ALL that apply)
A. CURRENTLY INVOLVED IN PURCHASING B. PLAN TO PURCHASE
SYSTEMS/PERIPHERALS
01. Laptops
02. Desktops
03. Intel-based Servers
04. Risc-based Servers
05. Applications Servers
06. Blade Servers
07. Print/Fax/Video Servers
08. Remote Access Servers
09. Mid-range Systems (including Workstations)
10. Mainframes
11. Printers
12. Network Copiers/Printers (hybrids)
13. Enclosures/Racks/Furniture
14. KVM Switches
15. Other Computers/Peripherals
SOFTWARE/APPLICATIONS
16. Web Services
17. Desktop/Server Operating Systems
18. Network/Systems Management

(Question #9 - Continued)
19. Application Management
20. SLA Management
21. Directory Services
22. E-Mail/Unified Messaging
23. Groupware
24. Database Management Systems
25. Customer & Supplier Resource Mgmt. (CRM)
26. Enterprise Resource Planning (ERP)
27. XML Tools
28. Desktop Videoconferencing
29. Middleware
30. Data Warehousing/Business Analytics/EIS
31. Enterprise Application Intergration (EAI)
32. Applications Development Tools
33. Other Software/Applications
BUSINESS SERVICES
34. ASP/MSP/SSP Services
35. Systems Integration/Consulting
36. Education/Training Services
37. Other Services
None of the above (1-37) 38.

10 Please indicate the platforms that are currently installed/planned. (check ALL that apply)
A. CURRENTLY INSTALLED B. PLAN TO PURCHASE
NETWORK PROTOCOLS
01. TCP/IP v4
02. TCP/IP v6
03. SNA/APPN/APPN/LU6.2
04. Novell IPX/SPX
05. NETBIOS/NETBUEI
06. NFS
07. Other Network Protocols
21. Frame Relay
22. Private Line T1, T3, OC-3, OC-12
23. Other LAN/WAN Environment
DESKTOP/SERVER OPERATING SYSTEMS
24. Windows XP
25. Windows 2000
26. Windows 95/98/ME
27. Windows NT
28. Novell (NetWare 6.X, 5.X, 4.X, 3.X, 2.X)
29. Linux
30. UNIX
31. SOLARIS
32. IBM MVS/VM/VSE/ESA
33. OS/400
34. Digital VMS
35. Macintosh
36. Palm OS
37. Windows CE
38. Other Operating System
None of the above (1-38) 39.

11 Which of the following hardware platforms are installed/planned in your company? (check ALL that apply)
A. SERVERS B. WORKSTATIONS/DESKTOPS/LAPTOPS
01. IBM (Mainframes)
02. IBM RS/6000
03. IBM AS/400
04. Digital/Tandem/Compaq
05. Unisys
06. H-P
07. Other
01. Sun Microsystems
02. H-P
03. Compaq
04. IBM
05. Dell
06. Gateway
07. Fujitsu
08. Toshiba
09. Sony
10. Apple
11. Other

12 What is the estimated gross revenue of your entire company/institution? (check ONE only)
01. \$20 Billion or More
02. \$10 Billion to \$19.9 Billion
03. \$1 Billion to \$9.9 Billion
04. \$500 Million to \$999.9 Million
05. \$100 Million to \$499.9 Million
06. \$50 Million to \$99.9 Million
07. \$10 Million to \$49.9 Million
08. \$5 Million to \$9.9 Million
09. \$4.9 Million or Less
10. None of the above

13 For which areas outside of the U.S.A. do you have purchase influence?
1. Europe 2. Asia 3. South America 4. Australia 5. Middle East 6. Africa 7. Canada 8. None

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